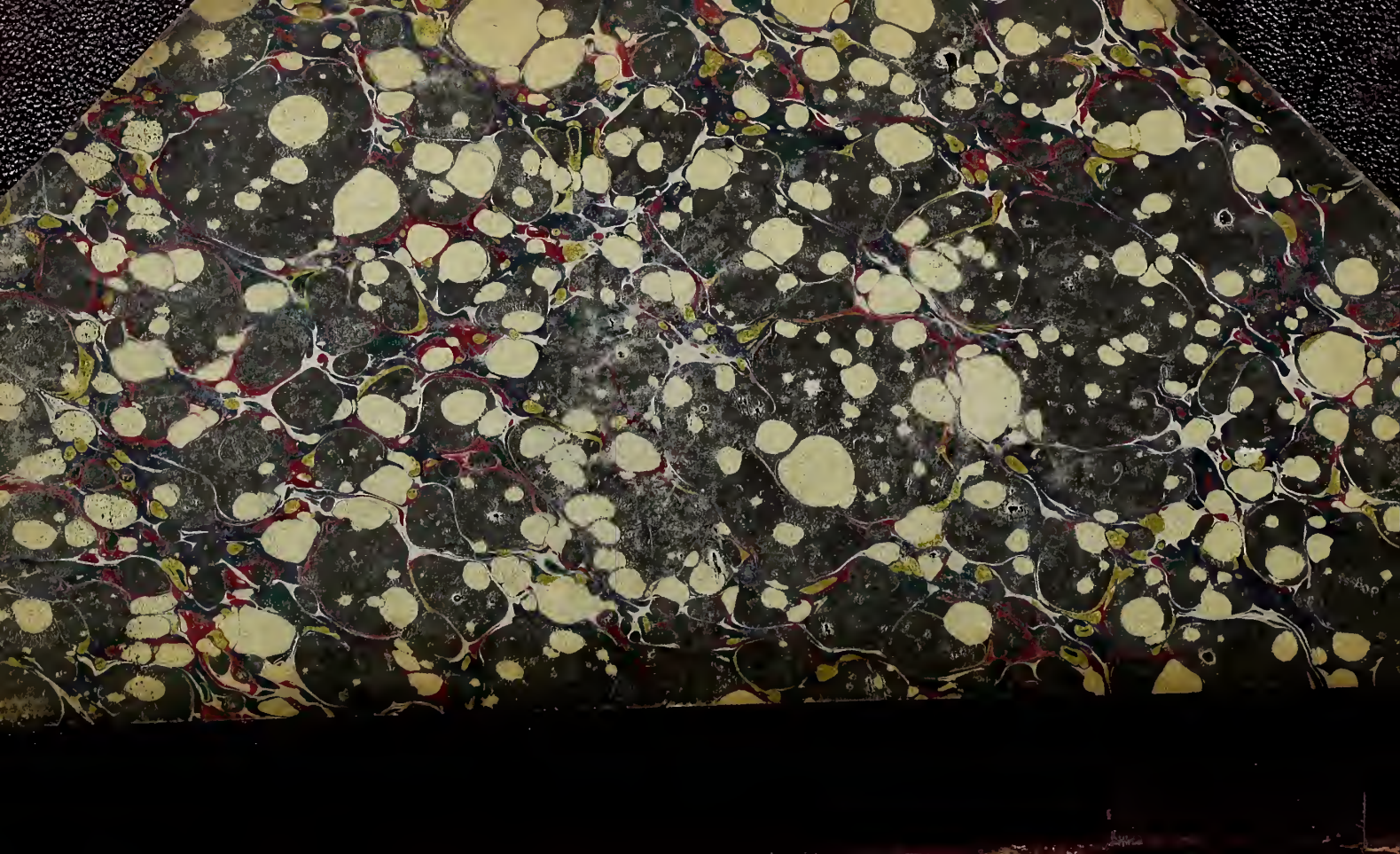

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I.—*Description of Ancient Temples and Ruins at Chárdwár in Assam. By Captain* G. E. Westmacott, *Assistant, Governor General's Agent, N. E. Frontier.*

Towards the close of November last, I had occasion to proceed on public duty into Chárdwár, a small district in the northern division of Central Assam, being on the north bank of the river Brahmaputra between Lat. 26° 32′ and 26° 51′, and Long. 92° 19′ and 92° 55′. It has its name from conducting to four passes of Bhután, and is bounded on the north by hills of various altitude, situate at the base of the Himálaya, and inhabited by three wild tribes of mountaineers, called *Duphlas, Akhás, and Kupah Chowahs* ;* the Brahmaputra, confines it on the south ; to the East it has the Bhairaví river, which divides it from Nondwár, and to the west the river Rhotás, which separates it from the small district of Chúteáh.

I think it necessary to state thus much in the way of introduction, to point out the precise locality of the ruins I am about to describe, as it is doubtful if many of my readers are aware of the geographical position of a district placed in so remote a corner of our possessions.

In the south-east angle of Chárdwár, a chain of granite hills, rising from two hundred to five hundred feet above sea level, and clothed with grass and forest trees, sweeps outwards in a crescent form from

* Kupah Chowah is a corruption from *kupás-chor* or cotton stealer, a name to which the people are well entitled from their predatory habits ; but the Chárdwárians stand in mucb awe of these robbers, and shrink from bestowing on them so uncourteous an appellative. They come of the same stock with the Akhás, from whom they differ in few respects, and are said to have divided into a separate clan about sixty years since in the reign of Lachmi' Singh king of Assam.

the Bhairaví to the Brahmaputra. The inhabitants assert, these hills were originally called *Agnighar* or *Agnígarh*, the place or fort of fire, from their constantly sending forth flames, or, as others affirm, from a rájá named BANU having made a fort on the spot of fire: they add, that KRISHNA mounted on his garúra (a creature half-bird half-man, corresponding with the eagle of the Grecian Jupiter,) brought hither a supply of water and quenched the fires, and that in commemoration of the event the name of the hills was changed to *Porá*, which in the dialect of Assam signifies 'the burnt,' a name they still retain. I thought it possible this obscure tradition might be connected in some way with the existence at a former period of volcanos, but after an active scrutiny of the spot no traces of subterranean fire were discovered to bear out the supposition. I had taken up my abode temporarily in the neighbourhood, when I accidentally learnt there were some gigantic ruins to be seen in the wilds, respecting which the natives could furnish no satisfactory information: on proceeding in the direction indicated, I found it impracticable to conduct the search from the density of the jungle, which consisted of lofty trees entwined with parasitical plants, and reed-grass upwards of twenty feet high swarming with wild animals; these obstacles were partly removed with the assistance of some peasants, and opened to view many interesting remains of antiquity which amply recompensed me for the trouble I had taken.

The first temple I examined appeared to have faced the north, and to have been provided with a portico supported on three columns of sixteen sides; each shaft, not including the plinth and pedestal which stand four feet above the ground, measured eight feet high and five and a half in girth, and was wrought from a single block of fine granite. The shafts have sculptured capitals, while the surbases take the form of an octagon, and the plinths are circular at top, and spread into four feet, making a sort of cross that measured four and three quarters feet each way. Three gigantic stones, with the fragments of a fourth, each hewn from a single block fourteen feet long, and cut into five irregular sides of which the total showed a circumference of eight feet, seem to have formed the entablature of the entrance porch, which I judged to have been fifty-six feet long. The frieze has three tiers of carving in *basso relievo* representing scrolls of flowers; the apertures in which iron rivets were introduced can be distinctly traced, and it is evident that no cement was employed to unite the materials. The other members were too much shattered and dispersed to enable me to conjecture the form of the temple; from a great portion of the surrounding works being in an unfinished state, it affords the presumption that the architect must have met some unlooked-for interruption; and

that this and the other buildings were overthown at the same period by some hostile power opposed to the propagation of Hinduism, assisted perhaps subsequently by a convulsion of nature. Earthquakes, I need scarcely observe, are more frequent in Assam than in any other quarter of our Indian possessions, and that they accomplish so small an amount of mischief must be attributed to its never having been the custom to employ stone and brick in the construction of dwellings. All classes, from the king to the serf, build with such slight and perishable materials as grass, bambus, and timber; thus houses sustain little injury from a shock however violent, and even if thrown down could not do much mischief to their inmates*. Had time been the sole instrument of overthrowing these structures, it is but fair to suppose from the great solidity of the materials that the ruin would have been less complete, and that the fragments would have lain in a narrower compass.

Chárdwár at one period undoubtedly formed a part of the ancient and extensive kingdom of Kámrúp, but whether the city at Porá was destroyed by the Muhammedans during their invasions, or by the Ahom kings prior to their conversion to the Hindu faith; or was overthrown at a later period by the Vaishnavas in their struggles for pre-eminence with the Saivas, is alike matter for conjecture. In the absence of inscriptions and other precise information we must have recourse to the traditions current in the country, and to such historical records as are within our reach; these I now purpose to advert to.

The inhabitants of Chárdwár assert, that Rájá Banh, the founder of Porá, was a demi-god, sixth in direct descent from Brahma; they add on the authority of some work whose name has escaped me, that his dominions were situate on the banks of the Nermadá river; that he journeyed into Kámrúp, Chárdwár, and other parts of Assam, and was the first person who introduced the worship of Mahádé'va into that quarter of India. The extensive walls which encompass the temples at Porá, are said to have made part of a fort or city founded by him called Lohitpúr, Sonitpúr or Tejpúr, all three signifying the

* In an ancient MS. I have met with, written according to the custom of the country on the inner surface of the bark of the *sachí* tree, a very destructive earthquake is recorded to have happened in the A. S. 1529 (A. D. 1607), when the earth opened and vomited a vast quantity of sand and water. On the 31st March last, two severe shocks were felt throughout Assam; the first cast down the stone spire of a temple at Bishnáth, fractured an idol within the shrine, and effected other damage in the province, and on the 3rd of November following there was another quake of less violence.

city of blood, perhaps in commemoration of a battle stated to have been fought there between KRISHNA and the Rájá. The 'Srí Bhagavat,' to which I referred, informs us that BANH was the son of BALI', the generous, and that he had a thousand arms, which probably means in a figurative sense that he was endued with immense strength; this power is said to have been conferred on him by SIVA, who also promised to defend his capital against external foes, in return for the pleasure he derived from the rájá's musical performance, (a talent in which he excelled,) when he played on some occasion before the god who was dancing with his votaries. On obtaining this boon, the invincible BANH subdued both gods and men, and returning to Sonit-púr surrounded his capital with fortifications of water, wind and fire, and lived there in perfect security; but when he found after a short time that none were able to oppose him, his heart was swollen with pride, and repairing to the court of SIVA he declared, that as he was indomitable the boon bestowed was worthless, and wished to know if there really was any one capable of resisting him. The god, displeased at his arrogance, presented him with a flag, which he desired him to hoist upon his palace, and promised that whenever it should fall an antagonist would appear to humble his power: delighted with the gift BANH returned home, and waited patiently the fulfilment of the prophecy.

The narrative goes on to say, that BANH had a daughter called from her extreme beauty, U'SA, or 'morning,' who was visited in a dream by ANIRUD the son of PRADYU'MNA and grandson of KÁMDE'VA; that on awaking from sleep the damsel indulged in loud laments, and was inconsolable at missing the lovely form imprinted on her memory, and which had occupied so large a share of her midnight thoughts.

One of her handmaidens, by name CHITRA-LIKHÁ or 'The Limner,' daughter to KU'MBHAND her father's minister, moved by her excess of sorrow, inquired its cause, and U'SA, reposing confidence in the attendant, related her eventful dream regarding 'a man of sable hue with lotus-eyes, long-arms, and clad in yellow garments, beloved among women, who had abandoned her in the ocean of distress.' CHITRA-LIKHÁ soothed her affliction by engaging to produce the object of her love: she painted the images of gods, of demi-gods, sages and powerful kings of the earth, of the house of BRISHNI', of ANU-DU'NDAVI'*, of BALARA'M†, and of PRADYU'MNA, which last (being the likeness of her father-in-law,) as soon as U'SA looked upon she was

* VASU-DE'VA the father of KRISHNA. † Foster brother of KRISHNA.

ashamed. The limner next painted the likeness of ANIRUD, and when U'SA saw it she modestly hung down her head, and exclaimed smiling, 'This is he who has robbed me of my heart.' Recognising the portrait to be that of KRISHNA's grand-son, CHITRA-LIKHÁ left her mistress and departed for *Dwárikà* (on the sea coast near the gulf of Cach, at that period governed by KRISHNA,) and seeing ANIRUD, sleeping on a couch, she by means of enchantments spirited him away and brought him in safety to Sonitpúr. U'SA, overjoyed at the sight of her beloved, introduced him to her private apartments, and he intoxicated with pleasure took no account of time. The military guard in attendance on U'SA suspecting that some stranger had gained access to the harem and seduced the lady from her maidenly vows, waited on the prince, and apprised him his daughter's conduct had brought a stain upon his lineage. BANH, distressed at the news, repaired with some armed followers to his daughter's apartments, and surprised the lovers playing the game of chess: ANIRUD starting up on their approach, seized his bow and discharged a flight of arrows with so much precision against the hostile party that they took to flight; BANH, however, whose rage had now passed all bounds, disregarding the tears and lamentations of his daughter, seized upon ANIRUD and bound him with cords.

Meanwhile KRISHNA, having missed his grand-son during the four rainy months, was filled with anxiety for his safety, a feeling in which the other friends of ANIRUD participated, and at length intelligence of his confinement reaching them through a sage called NA'RAD, the race of BRISHNI' of whom KRISHNA is the lord, went up to Sonitpúr with twelve legions, and attacking the city on all sides broke down the walls and buildings and destroyed the orchards. Exasperated at the mischief that was done, BANH came forth with an army whose divisions equalled in number those of the foe, and assisted by SIVA who rode on his bull, and came attended by his son and votaries, gave battle to BALARÁM and KRISHNA: a bloody engagement ensued; but at length KRISHNA bewitched SIVA whose votaries fled, and slew a vast number of BANH's army.

Furious at the prospect of defeat the prince sought out KRISHNA and encountered him in single combat, but the god cut through his adversary's bow-string, destroyed his car, slew the charioteer and horses, and sounded his shell in token of exultation. KU'TABI' the mother of BANH, trembling for the life of her son, appeared naked and with dishevelled locks in presence of KRISHNA, and he ashamed at the spectacle cast down his head, an occasion which the lord of Sonitpúr immediately seized upon to make his escape, and fled for refuge to his capital.

After this event, Siva visited Krishna's army with fever; but the latter not to be outdone in modes of annoyance created another fever to contend with that of his adversary, and came off victorious. The rájá now advanced a second time to give battle, holding a variety of weapons in his thousand hands, which he hurled at Krishna, who broke them with his discus and hewed off the prince's arms like branches from a giant tree; seeing the peril in which he stood, Mahádé'va advanced and besought his brother deity to save the life of his favourite. Krishna made answer, that he was bound to gratify Mahádé'va, and that he intended to spare the prince because he was the son of Bali and grand-son of Prahlád, whose race he had promised never to destroy—'What I have done,' continued the god, 'was to subvert his pride, I have lopped off his superfluous arms, and the four which remain are quite sufficient to enable him to enjoy eternal life.' Thus assured Banh fell at Krishna's feet, and brought forth Anirud and his daughter, seated in a car richly apparelled and ornamented, and surrounded by countless armies; Krishna was content, and returned to his kingdom of Dwáriká.

The next account, which has less admixture of the fabulous and appears the most deserving of attention, is taken from ancient records in MS. of the Assam kings, which speak of a place called Pratáppúr, the splendid city, the capital of Rámachandra, usually known under the name of the Pratáppúriya rájá, and which can, I think, be no other than Porá. This town is stated in the MS. to have been placed on the north bank of the Brahmaputra, a little below Bishnáth; and as the entire country bordering the river from Porá eastward to Bishnáth, with the exception of a range of hills three miles above the former, where the Bhairaví enters the great stream, is covered with swamp to the extent of several miles inland; there are strong grounds for supposing that Pratáppúr and Porá are the same. The present path from Porá to Bishnáth, which is only practicable in the dry months, often runs so far as six miles from the river, and the travelling distance does not exceed twenty-six or twenty-eight miles; while to the eastward of the Porá chain, extensive morasses skirt the Brahmaputra, without interruption, as far as Chúteáh, from twenty-five to thirty miles distant. No ruins have been discovered nearer to Bishnáth than the spot indicated, and though it is possible the site of Pratáppúr may have disappeared in the lapse of ages, it must not be forgotten that it was always usual with the kings of Assam to found their capitals on the bank of the Brahmaputra or other navigable streams, and to choose a situation removed alike beyond the reach of inundation, and the chance of being swept away by the floods—advantages which are possessed by Porá in an admirable degree.

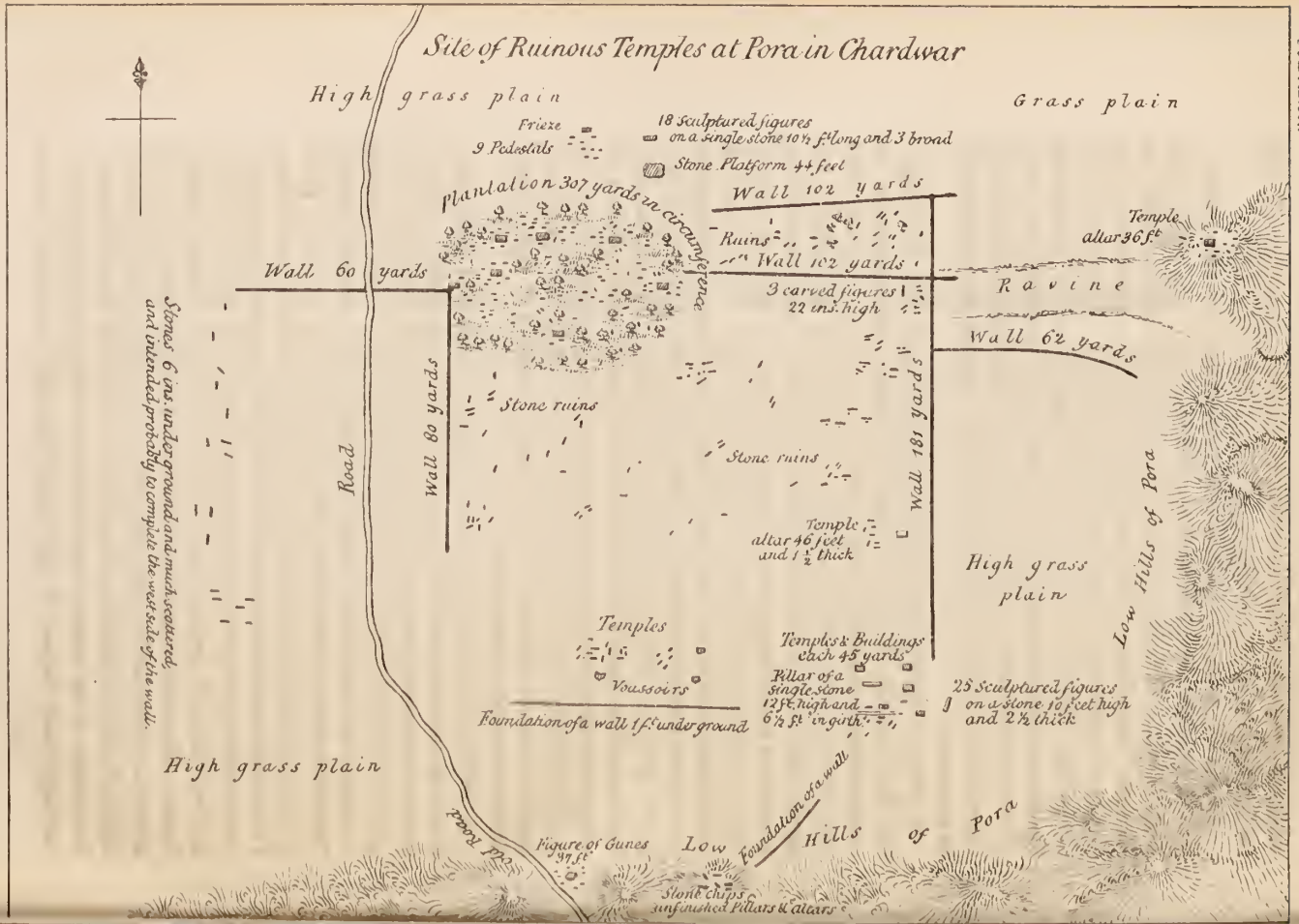
Rámachandra was, according to the volume I consulted, the twenty-fourth sovereign of a kingdom which embraced part of ancient Kámrúp, and made the eleventh of a third dynasty of its kings. Shubáhu the thirteenth sovereign, and ninth and last of the second dynasty, was vanquished by Vikrama'ditya, and was succeeded by Jitari, a pious Chhatrí from Dabera in the Dakhan, who overcame Kámrúp, and on ascending the throne, assumed the title of Dharma-pa'l. He was the progenitor of Ra'machandra, who began to reign A. S. 1160, (A. D. 1238-9.) and is the first prince the date of whose accession is commemorated in the volume. Ra'machandra is stated to have wedded with a daughter of the Kiat Rájá, who ruled a country on the south bank of the Brahmaputra, and whose subjects followed the occupation of fishermen; some remains of his capital are to be seen, it is affirmed, on the Bakaní Chaprí, an extensive island supposed to have been separated from the main land, or thrown up by the river. The princess, his daughter, was known among the people by the name of the Kamalá Kunri', but in books she is styled Chandra Prabhá'. She was walking one day during her husband's absence on the bank of the Brahmaputra when the god, becoming enamoured of her extraordinary beauty, fell a prey to sensual desires, and effected his purpose by embracing the princess with his waves; but another account attributes her impregnation with greater show of probability to a young bráhman of the prince's household, and declares the amour with the river god was a fabrication of the lady to conceal the lapse of which she was guilty from her parent. Passing over that part of the narrative which details the discovery of her inconstancy, and the means to which Ra'machandra had recourse to put a termination to her existence, all of which failed of success, we come to the period when the princess, who had taken refuge at her father's court, gave birth to a son who was called from his beauty Shashánk; his head bore the impress of an árí-fish, which marked his parentage, and hence he acquired the surname A'rimastha, or A'rimath, *i. e.* having the head of an árí-fish. He passed his early years with the father of his mother, and subsequently removed to the north bank of the Brahmaputra, where he acquired territory; he made war upon Rájá Phenua of Phenuágarh, in Kámrúp, where the remains of a small fort are still to be seen, and reduced that prince to subjection; and afterwards constructed a fort called Badyagarh at Háthimorá, in Kachárí mahal, which is still in existence, and made it his residence. In the course of his wars A'rimath extended his conquests to the kingdom of Ra'machandra, of whose relationship to himself he was ignorant; he laid siege to Pratáppúr,

and through the treachery of a drummer of the garrison, who gave notice of a fitting time for attack, he surprised a part of the works that were imperfectly defended, made himself master of the fortress, and beheading RA'MACHANDRA returned in triumph to Badyagarh.

Some discrepancies are here apparent in two MSS. I consulted; one account states A'RIMATH slew PHENUA, while another maintains that PHENUA usurped the throne of A'RIMATH on the death of the latter, and abode in Phenuágarh. GAJANK, the son of A'RIMATH, succeeded PHENUA, and made his residence near Pratáppúr, in the vicinity of Agnigarh, and it is provoking that from this time no further mention is made of the place. I shall merely add, that the last named prince was followed by his son SUKRANK, who died without issue A. S. 1400, (A. D. 1478-9,) when the dynasty of Jitarí became extinct.

The destruction of the temples at Porá is ascribed by some to an apostate bráhman of Kánoj, called PORÁ SUTHAN, or KÁLÁPAHÁR, who was compelled to embrace Muhammedanism, and at whose door the Chárdwárians and others in Assam lay all the sacrilege and mischief that has been consummated in the province. From their massive proportions, and the carving and ornaments being so much worn by time and exposure, the fanes are evidently the work of a remote era; I sought in vain for an inscription, and neither the priests of the district, nor the ancient families whom I consulted, could assist my researches, or point with an approximation to accuracy, to the date of their origin.

Unconnected with the first temple, and retired some yards deeper in the wood, or rather grove of trees, which was in likelihood planted by the priests who ministered at the temples, I found the ruins of six or seven other enormous structures of granite, broken into thousands of fragments, and dispersed over the ground in the same extraordinary manner as those already described. Altars of gigantic proportions were among the most remarkable objects: one of these measuring upwards of six feet each way, and eighteen inches thick, was elevated from seven to eight feet above the level of the plain, and approached on each side by layers of stone disposed in the nature of steps. It was hewn from a single block of granite; underneath was a sort of cavern: the top had holes for iron links, and a receptacle to receive flowers and water to bedew the Nandi or sacred bull of SIVA, who was placed, my informants imagined, on the brink of the reservoir. Six or eight other altars, one of them making a square of forty-six feet, and eighteen inches thick, are to be seen in other parts of the ruins, and several square blocks, each measuring from twenty to thirty feet, concave in the centre, and sculptured in imitation of circlets of flowers,


Site of Ruinous Temples at Pora in Chardwar
High grass plain
Grass plain
Frieze
9 Pedestals
18 Sculptured figures on a Single stone 10½ ft long and 3 broad
Stone Platform 44 feet
Wall 102 yards
plantation 307 yards in circumference
Ruins
Wall 102 yards
Temple altar 36 ft
Wall 60 yards
3 carved figures 22 ins. high
Ravine
Wall 62 yards
Stones 6 ins. under ground and much scattered, and intended probably to complete the west side of the wall.
Road
Wall 80 yards
Stone ruins
Stone ruins
Wall 181 yards
Temple altar 46 feet and 1½ thick
High grass plain
Low Hills of Pora
Temples
Temples & Buildings each 45 yards
Voussoirs
Pillar of a Single stone 12 ft high and 6½ ft in girth
25 Sculptured figures on a stone 10 feet high and 2½ thick
Foundation of a wall 1 ft under ground
High grass plain
Old Road
Figure of Gunes 37 ft
Low
Foundation of a wall
Hills of Pora
Stone chips unfinished Pillars & Altars

must have formed the Bedí or altar-place of Siva, as there is a seat for the Ling or symbol of the deity in the middle of each.

Among the specimens of sculptured figures that fell under observation, I discerned on a portion of frieze, nine images, each about a foot high, of whom Kanheya playing on a flute, and flanked by two Suhelís (damsels), were the only persons I could identify, though assisted by the priests of Chardwár. There were four figures of naked children eight inches high, that looked very much like Cupids; they were executed like the rest in basso relievo and were dancing or gambolling together in pairs, and another groupe of five figures, eight inches high, two of them in an obscene attitude, appeared like the others to have formed part of a cornice.

It will be seen from the sketch which accompanies this description, that the ruins are partly encompassed by walls, which extend in so many directions that it is scarcely possible to guess at the purpose of the architect. The walls have their foundations laid very deep in the earth: they are in an unfinished state, and were evidently constructed at a period long subsequent to the temples; they are built of massive blocks of cut stone, sometimes disposed in a double row, and exhibit a good deal of carving. The stones are of various shapes, and rise three or four feet from the ground, and were all intended to be united with bands of iron. The entrance of the principal enclosure appears to have been from the south, where lie some pedestals, and three or four wedge-shaped stones, about five feet long and three broad, of a flattened pentagonal shape, intended I presume to have formed the voussoirs of an arch; and the middle of the key-stone is decorated with a handsome diadem or plumed tiara.

A little to the north of the wood, buried in a forest of reed grass, which an elephant penetrated with difficulty, I discovered a very interesting fragment; this was a solid mass of granite, of a much finer grain than the kind used in the temples, measuring ten and a half feet in length, two and three-quarters in breadth, and two feet in depth. On this were sculptured, in very high relief, eighteen figures of gods, partially mutilated, but generally in a good state of preservation. Fifteen of the figures correspond in size, and are each eighteen inches high, and placed lengthwise in compartments, in groupes of threes. Of these the two external groupes, and the centre one representing, I think, Padma' (Lacshmi), supported by two females, are raised on the stone more than half a foot above the others; and again, each centre figure (Padma') of the compartments is more in relief than its fellows. The whole of the images have high cone-shaped head-dresses and ear-rings, and Padma' is represented standing on a snake, and the

attendants are supported on or rising from lotos flowers. The groupes of the two divisions, which are less elevated than the others, exhibit, I believe, DURGÁ, flanked by LACSHMI and SARASWATI; five of these figures are crowned with a sort of tri-pointed diadem, while the sixth has a round turban or cap. One of the forms of DURGA' has the right foot on the head of the demon, while the left is twisted up at her side, and the hands are clapsed over the breast, in the attitude of supplication; under the central groupe of the whole, and forming part of what may have been intended for the ornamented frieze of the temple, is a seated figure of GANESH in relief, five inches high, flanked by two other persons, one of them playing on a stringed instrument, and the other wielding a club. The lower part and sides of the block are decorated with a band of carving, showing beasts of different kinds, encircled by wreaths of flowers, in relief, and the gods are placed in scalloped arches, supported by pillars, which divide each of the images from its neighbour.

The priests are so little versed in the distinguishing characteristics of the Hindu deities, that they could not determine whom the figures were intended to represent.

Near the images are nine square pedestals of large dimensions, with three carved feet, which must have been intended to give support to as many columns: of these, several have almost disappeared in the earth; and it is likely, others are lost altogether. It shows at all events the design of the temple must have been projected on a large scale. These pedestals do not appear to have been moved from the spot where they were originally carved, and they are so little impaired by time and exposure to the elements, that I feel assured they are of modern date, compared with the buildings in the plantation and on the adjacent plains; they were, indeed, as fresh to look at as if but recently executed by the mason's chisel. Vast fragments of the epistylium and frieze, carved with beaded drapery, also lie half buried in the soil. The people at one time commenced fracturing the stones, from an idea that gold was concealed in their cavities, but desisted, on a mysterious warning of the goddess DURGA', who threatened to visit such sacrilegious attempts with death.

In the south-west angle of the Poṛá plains, there is another curious remnant of sculpture, also wrought from a single mass of granite, upwards of ten feet long, and two and a half feet thick at the middle; it appears to have formed the side of a gate, and has a band of carving three inches broad on each side, showing in relief elephants, tigers, deer, rams, cattle, and swans, encircled by scrolls of flowers. The stone has in all twenty-five figures of Hindu deities, disposed

cross-wise upon it; of these, the eighteen upper ones are in six rows, three of a row, and each in a separate compartment, while the centre figure is much more elevated than its fellows: they represent male and female divinities, twenty inches high; among them I recognized Hanumán. Another image has a fish's tail, and represents, I think, the Máchh Avatár or first incarnation of VISHNU, who is recorded to have appeared in the form of a fish to SATYAVRUTA, to warn him of the great flood. Several other figures are playing on stringed instruments, and the three lower ones are merely busts, with hands clapsed over the breast. The lowest compartment embraces three images, of whom SIVA occupies the middle place, and is provided with a venerable flowing beard; he stands thirty inches high, and on each side of him are females, twenty-six inches high: one has been destroyed, but the other is playing on a stringed instrument, and her ears are strung with a pair of enormous circular rings. Over this compartment are two groups of dwarf figures, six inches high, in a sedentary posture, and the whole sculpture bears evident marks of having been mutilated by a barbarian hand.

No quarries were discovered, to indicate that the stones were disembowelled from the hills; but quantities of chips were seen in places: and once I came upon pillars and altars in an unfinished state, shaped from blocks of granite, on the surface of the earth; and there seems no question that all the material employed on the fabrics was similarly procured from the masses of rock that cover the hills in great abundance. Once or twice only I fell in with well-burnt bricks; they were smooth and thin, of rather a large size, but not badly shaped. Great part of these extensive ruins are buried or have sunk into the earth, and they cover altogether four or five acres of land. I have been thus particular in noticing them, because there are not, so far as I know, any architectural remains in Assam, that can challenge a comparison with them for durability of material and magnitude of design; and it is certain, from the prodigious number of ruinous and deserted temples, all of which appear to have been dedicated to SIVA, being within the circuit of a few miles of Poŕá (I discovered twelve or fifteen in as many days on the hills and highlands at their feet), that this spot must have been the capital of a sovereign Prince, or a principal seat of the Hindu religion, and enjoyed a large share of prosperity at some remote period*.

* The records of Assam, which I consulted, mention, that CHU CHENG PHA', the seventeenth sovereign of the Ahom dynasty, in a direct descent from CHU KA PHA', the conqueror and founder of the kingdom, being stung with remorse for the

II.—*Remarks on an Inscription in the Ranjá and Tibetan (Uchhén) Characters, taken from a Temple on the Confines of the Valley of Nepál. By* B. H. HODGSON, *Esq. Resident.*

On the main road from the valley of Nepal to Tibet, by the Eastern or Kúti Pass of the Hemáchal, and about two miles beyond the ridge of hills environing the valley, there stands a diminutive stone *chaitya*, supported, as usual, by a wide, graduated, basement.

Upon the outer surface of the retaining walls of this basement are inscribed a variety of texts from the Bauddha Scriptures, and amongst others, the celebrated Shad-Akshari Mantra, *Om Mani Padme Hom.* This is an invocation of PADMÁ PÁNI, the 4th Dhyáni Bodhisatwa, and præsens Divus of the Theistic school of Buddhists—with an accessary mention of their triad, under that symbolic, literal form which is common to them and to the Brahmanists*. It is not, however, my present purpose to dwell upon the real and full import of these words; but to exhibit the inscription itself, as an interesting specimen of the practical conjunction of those two varieties of the Devanágari letters which may be said to belong respectively and appropriately to the Saugatas of Nepál and of Tibet. Not that *both* forms have not been long familiar to the Tibetans, but that they still consider, and call, that one *foreign* and *Indian* which the Nipálese Bauddha Scriptures exhibit as the ordinary ecriture; and which, though allowed by the Nipalese to be Indian, and though most certainly deduceable from the Devanágari standard, is not now, nor has been for ages, extant in any part of India.

cold-blooded executions which he caused to be done upon many innocent persons, erected a temple to MAHESWAR (SIVA), and first established Hinduism as the religion of the realm. According to one author, CHU CHENG PHA' ascended the throne in the year of Sakádityá 1524 (A. D. 1602), while another author places the occurrence fourteen years later. He died A. S. 1563, (A. D. 1641.)

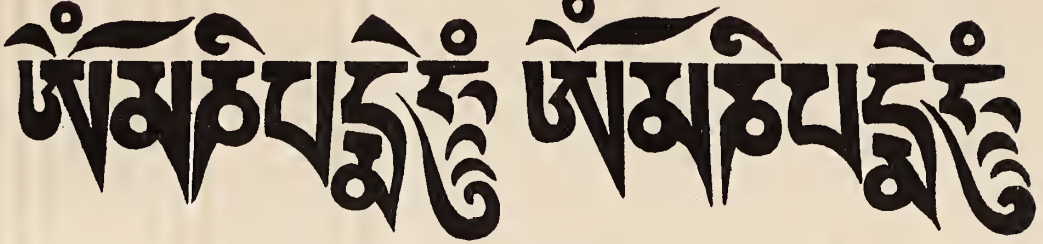
I think Dr. BUCHANAN must have been wrongly informed, when he asserts the conversion of the royal family to the new faith was effected in the reign of GADADHAR SINGH, who he calls the fourteenth prince of the family; while I make him out to be the twenty-ninth in succession to CHU KA PHA'; he was however the first Ahom sovereign who took the Hindu title, which may have led the Dr. to credit the information communicated to him.

The proper name of the king GADA'DHAR SINGH was CHU PAT PHA', and he reigned from A. S. 1603 to 1617, (A. D. 1681 to 1695.) In A. D. 1692-3, he dispossessed all the Bhukuts of their possessions, and compelled them to reside together in Kámrup, in Upper Assam; and in the year following, he cast all the images of the votaries of VISHNU into the Bruhmaputra.

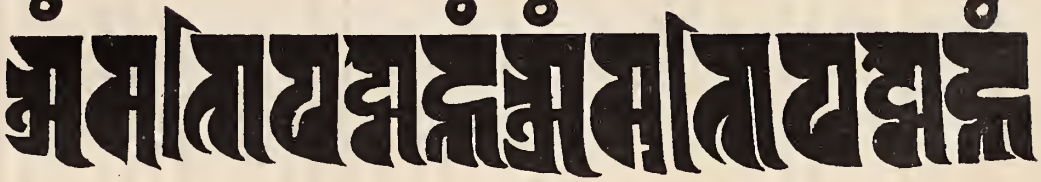
* Viz. the triliteral syllable Om, composed of the letters A, U, and M, typifing, with the Brahmanists, Brahmá, Vishnu, and Mahesá—but with the Buddhists, Buddha, Dharmá, and Sanga.

Inscription on a Chaitya at Dánra gáon, 15 Miles E. of Kathmandu.

Tibetan characters



Ranja characters



It is peculiarly Nipálese; and all the old Sanscrit works of the Bauddhas of Nepál are written in this character, or, in the cognate style denominated Bhujin Múlá—which latter, however, I do but incidentally name. I wish here to draw attention to the fact that that form of writing or system of letters called Lantza in Tibet, and there considered foreign and Indian, though no where extant in the plains of India, is the *common vehicle of the Sanscrit language amongst the Bauddhas of Nepál proper*, by whom it is denominated Ranjá, and written thus, in Devanágari रंजा; *Ranjá* therefore, and not according to a barbarian metamorphosis *Lantza*, it *shoutd* be called by us; and, by way of further and clearer distinction, the Nipálese variety of Devanágari. Obviously deduceable as this form is, from the Indian standard, and still enshrined as it is in numerous *Sanscrit* works, it is an interesting circumstance to observe it, in *practical collocation* with the ordinary Tibetan form—likewise, undoubtedly Indian, but far less easily traceable to its source in the Devanágari alphabet, and devoted to the expression of a language *radically different from Sanscrit*. Nor when it is considered that Ranjá is the common extant vehicle of those original Sanscrit works of which the Tibetan books are translations, will the interest of an inscription, traced *on one slab in both characters*, be denied to be considerable. Singular indications, indeed, are these of that gradual process of transplantation, whereby a large portion of Indian literature was naturalized beyond the Himálaya, as well as of the gradual eradication of that literature from the soil of its birth, where, for four centuries probably, the *very memory of it* has passed away*! Those who are engaged at present in decyphering ancient inscriptions would do well, I conceive, to essay the tracing, through Ranjá and Bhujin Múlá†, of the transmutation of Devanágari into the Tibetan alphabet. In conclusion, I may observe, that this habit of promulgating the *mantras* of their faith, by inscriptions patent on the face of religious edifices, is peculiar to the Tibetan Buddhists, those of Nepál considering it a high crime thus to subject them to vulgar, and perchance uninitiated utterance.

The Tibetan sentiment and practice are, in *this* respect, both the more orthodox and the more rational. But in another important respect, the Nipálese followers of Buddha are far more rational at least, if far less orthodox, than their neighbours: for they have utterly rejected that absurd and mischievous adherence to religious mendicancy and monachism which still distinguishes the Tibetans‡.

* The very names of the numerous Sanscrit Bauddha works recently discovered in Nepál were totally unknown to the Pandits of the plains, who received the announcement of the discovery with absolute disbelief.

† All the four systems of letters are given in the 16th vol. of the As. Researches.

‡ The curious may like to know that Tibetan Buddhism is distinguished from

I need hardly add, after what has been just stated, that the circumstance of the inscriptions being *mantras* proves the temple or *chaitya*, adverted to, to be the work of Tibetans, though existing on the very confines of Nepál proper—a fact indeed which, on the spot, wants no *such* confirmation. It is notorious; and is referrible to times when Tibetan influence was predominant on this side of the Himálaya. The great temple of *Khása chit*, standing in the midst of the valley of Nepál, is still exclusively appropriated by the Trans-Himálayans.

Note.—So much has been published on the subject of the mystical *mantra* above alluded to, that it is unnecessary to do more than direct the attention of the reader to the learned dissertation by GEORGI in the Alphabetum Tibetanum, page 500, &c. and to a more recent elucidation of the same subject in KLAPROTH's Fragmens Bouddhiques in the Journ. Asiatique, Mars, 1831, p. 27.—The *mantra* is quite unknown to the Buddhists of Ceylon and the Eastern Peninsula, and it forms a peculiar feature of the Tibetan Buddhism, shewing its adoption of much of the Brahmanical mystic philosophy. A wooden block, cut in Tibet for printing the very passage in the two characters, and from its appearance of some antiquity, is deposited in the museum of the Asiatic Society.—ED.

Note.—M. KLAPROTH, in his memoir in the Nouveau Journal Asiatique, where he has brought so much of the erudition of Eastern and Central Asia to bear upon this Buddhist formulary, attaches himself to two versions principally, as preferable to all that he finds elsewhere among Tibetans, Mongolians, and Chinese. The former is, "Oh precieux Lotus! Amen," on the supposition of ॐ. मणिपद्म हूं being the true reading; but if it be read, as he justly prefers, ॐ मणिपद्मे हूं, "Oh! le joyau est dans le Lotus. Amen."

There is no objection to the former translation, that of "*Om mani-padma húm:*" for the two nouns cannot be read as *separate* vocatives, "Oh jewel! Oh Lotus!" (as M. CSOMA DE KÖRÖS informs us it is understood in Tibet,) without reading *mané* मणे instead of मणि.

The latter translation of "*Om mani padmé húm*" is not equally admissible: for it would require indispensably by grammatical rule, either the insertion of a Visarga after *mani*, or the substitution of a long *i* for the short one, so distinctly marked in the inscription; i. e. the nominative मणिः or मणी instead of the crude form मणि. The junction of the two nouns in one compound is therefore as necessary in the reading of the locative case, as in that of the vocative; and this makes it necessary to translate it thus: "AUM (i. e. the mystic triform divinity) is in the jewel-like Lotus. Amen." The legends cited by M. KLAPROTH respecting BUDDHA apply as well to this version of the formulary as to his. I hope that Mr. HODGSON may hereafter favour us with the import of these words, as explained in the yet unexplored treasures of *Sanscrit* Buddhist literature in Nepál." W. H. M.

Nipálese, *solely* by the two features above pointed out—unless we must add a qualified subjection on the part of the Saugatás of Nepál to caste, from which the Tibetans are free; but which in Nepál is a merely popular usage, stript of the sanction of religion, and altogether a very different thing from caste, properly so called.

III.—*Journal of a Tour through the Island of Rambree, (Rámrí; Sans. Rámávati,) on the Arracan Coast.* By Lieut. William Foley.

[Continued from page 95.]

The town of Rambree*, with its meandering creek, fine wooden bridges, and the handsome temples that surround it, is perhaps the prettiest spot upon the island; and from no place is it seen to such advantage as from the hill of *Koyandoung*. The creek is not very broad, but it contains sufficient water to admit of the approach of large boats to the market place—a matter of some importance in a country where land carriage is not to be obtained; or if procurable, would scarcely be available, from the absence of good roads, bridges, and ferries, throughout the island. The town is divided into the following compartments; viz. *Oung-tshiet*, *Shuwe-dong*, *Wedt-chu*, *Tath-tweng*, and *Taing-kuman*. The former commemorates the landing of the first Burmah chieftain at the ghaut of *Rambree*, when the island was first annexed to the dominions of Ava. In *Shuwe-dong*, a large pole, covered at the top with gold, was erected; and in its immediate vicinity, stood a house in which the conjurors† used to dance, invoking the aid of their favourite idol on the occasion of any calamity. *Wedt-chu* was so called from the great assemblage of pigs in that quarter. *Tath-tweng* was the site of the Burmah stockade, and now the locality of the Government jail, formed chiefly from the materials of that stockade. *Taing-kuman* is the place occupied by the *Kuman-thsí*, a class that shall be more particularly noticed hereafter. It is gene-

* Also called "*Táing*," or "*Yáing-Ruah*" by the Mughs; the provinces *Rambree*, *Maong*, and *Thandowey* having suffered considerably from the incursions of the Burmahs and Thaliens during the year 791 M. S. the *Rájá* Choumoeng, on his restoration to the throne of *Rukkhein-preh* (Arracan), adopted such means as were likely to restore them to their former flourishing condition; and for that purpose, deputed his minister Anunda'-Suya'h to proceed to those provinces, taking with him such Burmah or Thalien agriculturists and artisans as had been able to quit the country. Anunda'-Suya'h, in the first place, visited *Rambree* Island, forming colonies, and giving names to the several new settlements, according to the various ominous appearances that presented themselves. It is said, that during the night his vessel lay at anchor in the *Rambree Creek*, a voice was heard to exclaim,

"*Tháin-lo!*" "*Tháin-lo!*" Stop! Stop! a favourable omen, inducing a further stay at the place, and the foundation of a town that received the name of "*Táing*" or "*Táing-Ruah*."

† A set of vagabonds, receiving little countenance from the people at large. A man, attired in woman's apparel, connects himself with another of the profession, whom he calls his husband, and obtains for this husband a woman as his second wife, with whom both cohabit; every respectable native looks upon this class with disgust and horror.

rally admitted that the town has increased in size (though perhaps not in wealth) since it fell into the hands of the British; but this augmentation has been slow, and by no means equal to the expectations that might have been indulged on the change of rule. It would be foreign to the purpose of this brief sketch of *Rambree* to enter into a detail of those causes that seem to obstruct the accumulation of capital; but this much may be said, that the multiplication of taxes, by the intricate division of trades, and the vexatious nature of many of these taxes, is one grand check to the industry of the population; and from thence it is easy to deduce its consequences, as they may affect the revenue, or the morals of the people.

The whole of those improvements which have been made in the town of late years, and contribute so much to the comfort and convenience of the inhabitants, it owes to the taste and liberality of the magistrate* (now residing there), who has devoted large sums of money from his private purse towards the erection of bridges, market stalls, and other public buildings.

Noticing each class under a separate head, with the distinction of sexes, the number of souls residing in *Rambree town* will be as much as follows:

	Adult males.	Adult females.	Boys.	Girls.	Total of each.
Mughs, ...	1549	1637	1393	1224	5803
Burmahs, ...	554	473	359	375	1761
Kuman-thsí, ...	407	383	324	323	1437
			Grand total of souls,		9001

In addition to the above there are a few Musalmans and Hindus; but their number is comparatively small, and their residence in the town (especially of the latter), attended with so much uncertainty, that I have not thought it necessary to include them in the *census*. The Musalmans were either (originally) adventurers from Cathaí and Ava, or owe their extraction to the Musalmans of Bengal, who fell into the hands of the *Rukkhein* marauders in earlier times, and were taken prisoners during the wars of the *Rukkhein preh*† Rájás with the Nawábs of

* Captain WILLIAMS, 45th Regt. B. N. I.

† Arracan, known in past times as *Rekhá-pura;* and so called from its having been the abode of the "*Rakkhus;*" a fabulous monster, said to devour the inhabitants. The scene of this monster's alleged depredations seems to have been in the neighbourhood of what is now termed the "Fort of Arracan!" (*Mrou-u-mu*, built by Rájá CHOUMOENG, in the year of GAUTAMA 1150, and in the common era 792, or A. D. 1430.) On the extirpation of this monster, Arracan was termed "*Rukkhein-preh*," or "*Rukkhein-táing*," the country of the *Rukkheins;* an appellation equally common to the natives of Arracan with that of *Mugh*, or *Mogh:* the Burmahs substituting the letter *Y*, for *R*, call them "*Yukkhein.*"

Chittagong and Dacca. They are now so assimilated to the rest of the population in dress, language, and feature, that it is difficult to conceive a distinction ever existed. As if ashamed of their Muhammedan descent, individuals of this class have generally two names, one that they derive from birth, and the other such as is common to the natives of Arracan, and by which they are desirous of being known. The Hindus, again, are generally natives of Chittagong and Dacca, who came down into Arracan to pick up what they can, returning to their homes so soon as a certain sum of money shall have been collected.

Under the head of Mughs *(Magas)* are included many inferior castes, such as the *Hyáh*, *Phrá-gyoung*, and *Dhúng*. Much uncertainty prevails with respect to the origin of these castes; it is either involved in obscurity, or totally lost to those with whom I have conversed upon the subject. By some, it is affirmed, that the *Hyáhs* were originally natives of a country beyond *Manipur*, but nothing further could be obtained, so as to facilitate a discovery of their descent, or account for their settlement in the province. In former days, the *Hyáhs* tilled the crown lands, were exempted from taxation, and gave one-half of the produce to the sovereign. It is insinuated by the *Rakkheins*, that not a few of the *Hyáh* caste were employed as eunuchs in the service of the Arracan Rájas. They now occupy themselves in the cultivation of *pawn* and *chilly* gardens, but are looked upon as an inferior caste, and consequently never intermarry with the *Rakkheins*.

The caste termed *Phrá-gyoung* now no longer abound in Arracan, or are so concealed, that it would be difficult to point out one particular person to whom this term can be properly applied. In Ava this class is still very numerous, more especially in the neighbourhood of the most celebrated temples* and *Kioums*; it being the duty of the *Phrá-gyoungs* to perform the several servile offices required, such as sweeping the sanctuary, lighting the fires, and spreading the mats in the monasteries. As a reward for these services, they are permitted to remove, for their own consumption, the fruits, grain, &c. that may be offered up to the *Phrá*. The *Phrá-gyoungs* are said to have sprung from those who, in a distant period, had been convicted of some offence, and were made slaves for the service of the temples as a punishment for the same.

The *Dúngs* are believed to be of *Hindu* extraction; their appellation so like to that of the *Dhúms* of India would seem to corroborate

* Such as *Shuwe-Zettan* and *Shuwe-dag-gone*.

this statement; and it must be further remarked, that their occupation in former days is said to have resembled that now allotted to their namesakes in Bengál. The *Dhúngs* of Arracan will not, however, so employ themselves at the present day; endeavouring to conceal their true descent, they are generally rope-makers and fishermen.

Burmahs of pure extraction are rare in *Rambree;* those that retain the name are of mixed blood, and properly termed "*Bundáth.*" They are the descendants of those *Burmahs* who accompanied the several *Mey-o-wúns* to the province; uniting themselves with the Mugh women, and remaining in *Rambree* with their families on its being given over to the British.

The class of Musalmans termed *Kuman-thsí** are particularly deserving of notice. There is little doubt but this interesting people owe their descent to that devoted band of warriors which accompanied the unfortunate SHA'H SUJA'H into Arracan. As is well known, both the SHA'H and his followers, (who were numerous) met at first with a friendly reception from *Meng-ka-mong*†, the Rájá of *Rakkhein-preh.* But the repeated representations of the cold-hearted AURANGZEB induced the wretch to adopt another line of conduct; the SHA'H and his troops were several times attacked, and finally defeated. The prince was put to death, and such of his followers as survived the slaughter were made prisoners, and eventually distributed in different parts of the kingdom. Lands and implements of husdandry were assigned to them, and they were further encouraged to marry with the women of the country. Many availed themselves of this permission, and their wives did not object to embrace the faith of Islám. There is a curious circumstance connected with the distribution and final settlement of the *Kuman-thsí* in the province. When brought to the presence of *Meng-ka-mong,* and asked what profession they were individually desirous of adopting, a few who were unable to speak the language of the country, put their hands up to their heads, and pointing out the two fore-fingers, endeavoured to represent an animal with horns; thereby intimating that they wished to follow the occupation of herdsmen. Upon this the Rájá directed a supply of cattle and goats to be given to them, and those who received the latter were placed upon a small island that has since been termed *Tchye-kî-ún*‡ (Goat Island). In the time of the Arracan Rájás,

* Kamandar? Bowman? (*Kamánchí* more probably.—ED.)

† I feel a pleasure in giving the name of this individual, in the hope that it may tend to perpetuate his infamy.

‡ Called "*Saddle Island*" by the British.

and even so late as during the Burmah tenure of the country, the *Kuman-thsís* invariably attended the prince royal, or governors on their journey through the several provinces of the empire; preceding them upon the road, and bearing their bows and arrows in their hands. These implements of war are now laid aside, and the *Kuman-thsí* are, in common with others, occupied in such pursuits as are more congenial to the age; being for the most part weavers and dyers, and residing in a separate quarter of the town, the avowed adherents to the Muhammedan faith, but ignorant of the precepts it inculcates, and assimilating in practice to the rest of the population. Seven generations* are said to have passed away since the event above described; yet notwithstanding this lapse of time, and in spite of the similarity of language and attire, the features of the *Kuman-thsí* still betray their superior descent; while for beauty of stature, and agility of limb, they surpass the Muhammedans of India.

With the view of so many houses, and such a population as that contained in *Rambree*, together with the fact of its being the *second city in Arracan*, it is surprising to witness such apparent poverty in the show of empty shops on each side of the street. Here and there a Manchester shawl, a piece of chintz, or printed handkerchief might be seen hung up to view, surrounded with the more homely productions of the country; but the largest and best supplied shop of *Rambree* would scarcely be deemed worthy of notice in any one of the *sadar bazárs* of India. Few engaging in trade: the greater part of the population are either idlers, day-labourers, agriculturists, or fishermen, (as circumstances may induce,) having no regular occupation calling for the exercise of a dexterous and *continued* application. It is difficult to ascertain with precision the period of the greatest known prosperity in the town of *Rambree*. Different accounts are given by different people, according to their views, or the ideas they may entertain. Those who admit the population and wealth of *Rambree* to have been greater than they are at present, fix the date of such alleged prosperity during the administration of the Burmah *Mey-o-wun, Keodine-Yájah* (A. D. 1805). At that time *Rambree* was the grand emporium of trade; so many as 60 large *godahs* were known to enter the creek from different parts of Bengal, and proceed from thence to Rangoon and Tavoy, receiving at *Rambree* rowannahs spe-

* By Dow's account, it is 170 years ago. I must notice an error that the historian of India has fallen into; there is no river running from any part of Arracan into *Pegu*; the native name for Arracan proper is "*Peygrí*" or "*Peygí*," (signifying a large country,) and this word has been evidently confounded with *Pegu*.

cifying the duties they had paid, to secure them from further taxation on their arrival at any intermediate Burmah port. The town of *Rambree*, and indeed the whole island, suffered much in later years in consequence of the insurrection of the *Mughs*, excited by the Ramu Rája KIMBRANG, and only subdued by the energetic conduct of NEMYO-SUYA'H*, the Burmah chief to whom the *Mey-o-wun* SAOTI'JA'H had entrusted the defence. This rebellion was followed by a species of retaliation that deprived the town of *Rambree* of nearly the whole of its *Mugh* population. All the *súgris*, merchants, and others suspected of having conspired against the government were put to death, or obliged to fly the country.

It was the invariable, and, in some instances, necessary policy of the Burmese to trust as little as possible to the good will of the conquered. Securing their position by a strong stockade, and separating themselves from the inhabitants, they formed a little garrison of their own in *Rambree*; within this stockade all affairs both civil and military were transacted. The Burmah *Mey-o-wuns* were not, however, inattentive to the comfort of the people, or the embellishment of the town: the large tanks, *Kus*, and *Kioums* now seen at *Rambree*, were either constructed by the *Mey-o-wuns*, or by those who held situations of emolument, under them. Some of these temples are still existing, unscathed by the hand of man or the less hostile elements. Others, again, have crumbled into dust, the remains of those stupendous monuments that have marked the propagation of the Buddhist creed in the most distant parts of the world. Internally they are filled up with earth, the wall being of brick, well cemented together. Relics of GAUTAMA, such as the hair, feathers, bones, &c. of the several creatures whose form he assumed previous to his becoming man, with gold and silver images, dishes, goblets, and other utensils, are deposited in the interior: a certain portion of each placed in the upper, middle, and lower part of the temple The *Kioums* at *Rambree* town are, as might be expected, larger than those commonly met with on the island. One of these attracts attention from its superior size, and the elegance of its construction. It was built by a native of *Rambree*, named KOMENG-SHUWE-BO, who had been dewán to the Burmah *Mey-o-wun* SAOTI'JA'H, and was one of those to whom suspicion of conspiracy was attached, but saved from death at the intercession of the *Chilkî*† MOUNG-BO. KOMENG-SHUWE-BO was in later years exalted to the office of *Mey-o-wun* over the island‡ circles, the Burmah *Mey-o-*

* Afterwards *Mey-o-wún* at *Rambree*.

† The name for the Burmah *Superintendent of Police*.

‡ *Mrukyoung*, *Murajyne*, *Kweyne-Kgoung*, *Kyoung-saa-yah*, *Koukoh*, *and Múe-du-in-du*.

wún SHUWE-DONG-SA-GA-SU residing at *Rambree*. The latter was subsequently sent on a mission to Benares, and his brother *Mounge* appointed to officiate during his absence. The mission was directed to ascertain the existence of the *Bhodíbeng* tree, as well as the site of many places known to have been the scene of GAUTAMA's early labour. On the return of SHUWE-DONG-SU-GA-SU to the court of Ava, with the information obtained, he took the opportunity of effecting by the most *persuasive* means the dismissal of his rival from office, and from his unremitting but futile endeavours to regain that place by a method equally expensive, KOMENG-SHUWE-BO is now living in comparatively reduced circumstances at the town of *Rambree*.

The change of rule has perhaps been as fatal to the prosperity of the monastic sects, as it has been disadvantageous to those who once constituted the higher classes of the people. The influence voluntarily conceded to the *Phúngrís* by the Burmah *Mey-o-wúns* was astonishingly great, and reminds one much of the power once possessed by the priesthood of the Catholic kingdoms in Europe. In cases where a more peaceable species of intervention had proved unsuccessful, it was not uncommon for the *Phúngrís* to assemble for the rescue of a criminal about to suffer execution. The spot selected for the process of decapitation was in the neighbourhood of a large tree, at the S. E. extremity of the town. The unfortunate criminal, having been previously manacled, was led out for execution between files of Burmah soldiers, and when arrived at the ground was made to kneel with the head inclined, as a mark of obeisance to the ruler of the land, and avowal of the justice of the sentence. In the meantime, the head was severed from the body (generally with a single blow of the dao) by the executioner*, who stood behind waiting the signal for the stroke. It being deemed a crime to take away life, it is conceived, by the worshippers of BUDDHA, an act of piety to endeavour to save from death even the vilest of animated beings; and as little resistance was evinced towards a class held in such peculiar veneration, the *Phúngrís* not unfrequently succeeded in carying off the criminal before execution had been effected. Taking him to the *Kioum*, he remained there until death or a change of Government secured him from the malice of his enemies, and the vengeance of the law in punishment of his crimes.

* The *executioners* were individuals who had been condemned to death for heinous offences, and subsequently spared, on condition of their devoting their lives to the performance of this odious service. They were at the same time branded upon the cheek to guard against the chances of desertion.

At some little distance below the town, and on the right bank of the creek, is a small village, inhabited by that extraordinary race the *Kaengs*, of whose origin still less seems to be known than what has been imperfectly detailed of other castes. The *Kaengs of Rambree*, by their own account, came down many years ago from the mountainous regions of *Kaladong* and *Kyen-duing-myit*, in Arracan proper; and as they can give no information whatever respecting their first settlement in those places, it is possible that they may be the *aborigines* of the country. Divided into *clans*, and differing from both Mughs and Burmahs in feature as well as attire, the *Kaengs* have many peculiar customs of their own, some of which deserve to be noticed. When any one of a clan dies, the body is laid upon a funeral pile, and consumed: the ashes, carefully collected within an earthen vessel, are conveyed to the mountain from whence the clan was known to have originally come, and there deposited in the earth. There is something awfully grand in this manner of disposing of their dead, bespeaking the existence of that love of liberty and of country still engrafted in their souls, which had in some instances rendered them* secure from their enemies. That same spirit of Freedom dictated an observance† which, however revolting it may appear to European ideas, cannot fail to attract the admiration due to a virtuous feeling, that deems honor and reputation of more account than beauty, and has induced the father of a family to disfigure the faces of his daughters the more effectually to preserve them from the contamination of strangers. The mode of performing the operation is as follows: The young maiden is enveloped in a mat, and forcibly held down to the ground, while gun-powder or indigo is rapidly pricked into the skin (over the whole of her face) by means of a pointed instrument. This is generally done at an early age, and the pain produced by it ceases after the lapse of three or four days. So soon as released from the hands of her tormentors, the poor girl is presented to the dogs of the village, and should they evince any signs of anger or surprise, the operation is deemed to have been effectually performed. The *Kaengs* are not very numerous in Arracan, being found more plentifully distributed along the *Yúmadong*, and the less elevated mountains in their

* The *Kaengs* of Arracan were on some occasions particularly troublesome to the Burmese invaders, who feared to follow them to their mountain fastnesses.

† The *Kaeng* women are generally very handsome, and the Burmahs, as well as their predecessors, several times attempted to possess themselves of their persons: it was with the view of saving their daughters from such degradation that the *Kaengs* instituted the observance here described.

neighbourhood. Residing in the thickest part of the forest, and superior to the *Rakkheins* in hardiness of constitution, as well as bravery of soul, they are chiefly occupied in the pursuit of game, or in the collection of honey, wax, elephants' teeth, and such other forest produce as may meet with a ready sale in the plains. The *Kaengs* of *Rambree* are for the most part engaged in the cultivation of vegetables, and the manufacture of spirituous liquors, which are in general demand with those of their own class, forming an essential ingredient on all occasions of festivity, whether in the celebration of a marriage, or in the more important ceremonies of a funeral. Indifferent to the nature and quality of their food, they not only subsist on vegetables and grain, but eat the flesh of most animals—a preference being given to that of dogs and swine.

The *Kaengs* possess no written records whatever of their descent; and as they can neither read nor write, deeming it superfluous to instruct their children in such matters, it is not susprising that all traces of their origin should be either lost, or enveloped in total obscurity at the present time.

IV.—*On the amount of Rain-fall at Calcutta, as affected by the Declination of the Moon. By the Rev.* R. Everest.

Since my last paper upon this subject I have been enabled to compare the meteorological registers with the Nautical Almanacks. In doing this I have made out a table of the average daily quantity of rain that fell in each rainy season with every $2\frac{1}{2}$ degrees of the moon's declination. I have now the honour to lay it before the Society, and to add, that where the registers were complete, I have begun the average with the first rain that fell in April, and ended it with the last that fell in October.

Average Quantity of Rain in decimals of Inches in the years

Moon's declination.	1823	1824 and 1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	Gen. mean.
2°30′	·231	·000	·353	1·187	·152	·288	·320	·365	·189	·364	·345	·345
5°00	·110	·002	·831	·230	·180	·369	·660	·076	·223	·175	·412	·297
7°30′	·167	·000	·080	·586	·440	·449	·126	·119	·249	·316	·329	·260
10°	·315	·016	·164	·077	·229	·436	·350	·434	·332	·373	·370	·281
12°30′	·142	·153	·688	·078	·252	·373	·267	·141	·132	·079	·237	·231
15°0′	·483	·001	·340	·315	·502	·227	·230	·319	·144	·285	·249	·281
17°30′	·133	·152	·211	·205	·223	·317	·419	·409	·134	·269	·186	·242
20°0′	·196	·036	·305	·261	·632	·251	·234	·311	·180	·386	·253	·277
22°30′	·052	·096	·231						·33.	·277	·282	·211
25°	·721	·158								·622	·432	·483
27°30′	1·580											1·580

Note.—The periods for which these averages were taken, are for 1823, the months of August and September; for 1824 and 1825, Nov. Dec. Feb. and March; for 1826, May, June, July, August, Sept. Oct.; for 1828, July, Aug. Sept. and Oct.; for the other years, from the first rain in April to the last in October.

It will be observed that the numbers in the General Mean (the last column) are somewhat irregular, which I apprehend is owing to the series of years being too short for the subdivision I have adopted, viz. 2°.30′, if instead of that we take 5° as the subdivision, the numbers come out regularly, as follows :

Moon's declination.	*General Average of Rain-fall.*
5 degrees.	·321 inch.
10 do.	·271
15 do.	·256
20 do.	·259
25 do.	.347

The results are somewhat different from what I expected, for they shew an increase of rain, not only towards the maximum, but towards the minimum declination of the moon. Had it been towards the maximum only, we might have accounted for it by supposing the rain to vary with the principal tide, either superior, or inferior ; and had it been towards the minimum only, we might have supposed that the rain was the effect of the mean tide, as in all latitudes, less than 45°, the mean tide increases as the declination of the moon diminishes. However, when our data are more perfect, we may be able to get an explanation of the phenomena. In the meanwhile, lest any one should object that the series of years for which the average has been taken, is too short to establish the fact of an increase towards the maximum declination, I beg now to offer some other reasons which led me to the conclusion before I obtained a sight of the Almanacks.

I must first remind you that, owing to the revolution of the nodes of the moon, her maximum monthly declination decreases for a series of years, and then increases. Thus if we turn to the Table, we find that in the year 1829, and for two years both before and after it, the maximum declination was always less than 20°. This revolution of the nodes is completed in a period of about 18⅔ years, or more correctly, 6803 days, 2 hours, 55 minutes. Now then, supposing it to be true that the rain-falls vary with the declination of the moon ; in those years in which the declination is small the rains ought to be scanty, and *vice versâ* to increase as the former increases. We have no register of rain for a long series of years, but we have a valuable record left us for the illustration of this part of our subject, similar to that register of the height of the annual inundations of the Nile, which the ancient Egyptians measured by means of a Νειλοσκοπειον, or Nilometer, placed on the bank of the river ; I allude of course to Mr. Kyd's Register of the height of the Hooghly in different years*. In the map No. 4,

* See his paper on the subject, (Part 1. Trans. Phys. Class, As. Soc.) and the map which accompanies it.

subject, (Part 1. Trans. Phys. Class, As. Soc.) and map to accompany it. In the map No. 4, we have the line of the highest high water, and of highest low water in the different years, and I have transferred those heights into numbers (as nearly as could be done by common measurement), and then taken the mean of both for the mean height of the river in each year during the rainy season. Recollecting then, that the monthly maximum declination of the moon was at its least about Michaelmas 1829, its greatest would be about the end of May, 1820, and its least again, very early in 1811:—and regarding the Hooghly as the general rain gauge of the country*, we have the mean height of the river in each season, as follows:—

1806.	1807.	1808.	1809.	1810.	1811.	1812.	1813.	1814.	1815.	1816.
ft. in.										
15 10	15 11	15 0	15 6	14 4	15 0 min. dec.	14 10	13 10 *	14 9	15 4	14 1
1817.	1818.	1819.	1820.	1821.	1822.	1823.	1824.	1825.	1826.	1827
ft. in.										
15 5	16 4	15 8	15 9 max. declin. of ☽.	15 9	16 7	19 3 *	15 10	15 5	15 10	15 0

There is an irregularity in these numbers; and both the minimum and maximum height of the river appear to have occurred from two to three years after the maximum declination of the moon; but if we take the average of five or seven years nearest the maximum, and compare it with the average of a similar number of years nearest the minimum, the difference will be striking. A curious question here arises—Have we in history any record of inundations, or drought and famine corresponding in the times of their occurrence with these different positions of the moon? I think we have. But the question is one that demands a very wide research, much more so than, with my present limited means of reference, I am able to give it; but I hope at a future time to be able to lay a few items of information respecting it before the Society. In my last paper, I suggested that the great abundance of rain when the moon's declination was greater than 22°30′ might be accounted for by the locality of Calcutta, but on consulting my own register, I find that a similar effect was perceptible at Dehli (lat 28°40′) last year. As a sample of it, I subjoin the days in the month of July on which rain fell, with the amount, and declination of the moon at noon.

* It must be remembered that the level of the Hooghly at Calcutta is also affected materially by the tides of the Bay and by the prevailing winds of the season.—Ed.

1824.	*Inches Rain-fall.*	*Moon's declination.* ° ′
July 3,	3·49	17 54 n.
—— 4,	1·58	21 6
—— 5,	0·07	23 18
—— 6,	0·34	24 16
—— 7,	2·01	23 49
—— 8,	0·50	21 55
—— 13,	0·08	2 24 s.
—— 14,	0·56	8 5
—— 15,	2·16	13 19
July 16,	0·48	17 48
—— 19,	2·66	24 18
—— 20,	0·35	23 44
—— 21,	2·70	21 54
—— 22,	3·78	19 1
—— 23,	1·18	15 18
—— 29,	0·11	12 35 n.
—— 30,	0·50	16 39
—— 31,	0·90	20 6

I have not yet had leisure to compare the barometric and other indications with the moon's declination, but I shortly intend to do so. From present appearances I cannot help feeling sanguine that the moon's declination will be found to be the principal cause of the different atmospheric variations, exclusive, of course, of those which are occasioned by the regular annual progress of the sun. However, whether there be any thing of truth in these inferences, or whether I have been misled by a series of chance co-incidences, time only can determine. If those inferences are well founded, the years of drought are past, and the years of plenteous rain approaching. By this test let them be tried, for no one can desire a fairer.

1835.	*Moon's Dec.*
June 1,	23°11′n.
—— 2,	20 1
—— 5,	4 56 n.
—— 6,	1 12 s.
—— 9,	18 39
—— 10,	22 24
—— 11,	25 10
—— 12,	25 50
—— 13,	24 44
—— 14,	22 7
—— 15,	18 21
—— 18,	33 5 s
—— 19,	13 9 n.
—— 23,	19 53 n.
—— 24,	22 54
—— 25,	24 56
—— 26,	25 48
—— 27,	25 24
—— 28,	23 42
—— 29,	20 41
July 3,	0 23 n.
—— 7,	21 20 s.
—— 8,	24 23
—— 9,	25 46
—— 10,	25 22
—— 11,	23 19
—— 12,	19 54
—— 16,	05 n.
—— 20,	18 54
—— 21,	22 10
—— 22,	24 30
—— 23,	25 42
July 24°	25°39′
—— 25,	24 17
—— 26,	21 36
—— 27,	17 46
—— 30,	1 34 n.
—— 31,	4 28 s.
Aug. 3,	20 21
—— 4,	23 43
—— 5,	25 35
—— 6,	25 41
—— 7,	24 16
—— 8,	21 19
—— 12,	1 38 s.
—— 13,	34 4 n.
—— 16,	17 53
—— 17,	21 23
—— 18,	24 1
—— 19,	25 35
—— 20,	25 57
—— 21,	24 59
—— 22,	22 40
—— 23,	19 7
—— 26,	3 1 n.
—— 27,	3 10 s.
—— 30,	19 39
—— 31,	23 17
Sept. 1,	25 29
—— 2,	26 3
—— 3,	25 0
—— 4,	22 28
—— 5,	18 43
—— 8,	3 26 s.
—— 9,	2 3 n.
Sept. 13,	20°34′
—— 14,	23 30
—— 15,	25 26
—— 16,	26 12
—— 17,	25 42
—— 18,	23 52
—— 19,	20 45
—— 23,	1 8 s.
—— 26,	18 44
—— 27,	22 47
—— 28,	25 22
—— 29,	26 18
—— 30,	25 36
Oct. 1,	23 23
—— 2,	19 55
—— 6,	0 23 n.
—— 10,	19 40
—— 11,	22 53
—— 12,	25 9
—— 13,	26 18
—— 14,	26 14
—— 15,	24 53
—— 16,	22 16
—— 17,	18 28
—— 20,	13 9 n.
—— 21,	4 51 s.
—— 24,	22 41
—— 25,	24 54
—— 26,	26 23
—— 27,	26 6
—— 28,	24 11
—— 29,	20 57

P. S.—I have added the above table of the days in the ensuing rainy season (1835) in which the declination of the moon is greater than 17° 30′ and less than 5°, in the hope that those who keep rain gauges in different latitudes and who have not the Almanacks to refer to, may take an interest in the subject, and favour us with some further information.

V.—*Further Note on the Inscription from Sárnáth, printed in the last No. of this Journal.*—*By* B. H. Hodgson, *Esq.*

[In a Letter to the Secy. As. Soc., read at the meeting of the 6th May.]

I have just got the 39th Number of the Journal, and hasten to tell you, that your enigma requires no Œdipus for its solution at Kathmandu, where almost every man, woman, and child, of the Bauddha faith, can repeat the *confessio fidei* (for such it may be called), inscribed on the Sárnáth stone. Dr. Mill was perfectly right in denying the alleged necessary connexion between the inscription, and the complement to it produced by M. Csoma de Körös. No such complement is needed, nor is found in the great doctrinal authorities, wherein the passage occurs in numberless places, sometimes containing but *half* of the complete dogma of the inscription; thus:—"*Yé Dharmá hetu-prabhavá; hetu teshán Tathágata.*" Even thus curtailed, the sense is complete, without the "*Teshán cha yó nirodha, evanq (vádí) Maha* Sraman'a," as you may perceive by the following translation:

"Of all things proceeding from cause, the cause is Tathágata;" or, with the additional word, "Of all things proceeding from cause; the cause of their procession hath the Tathágata explained." To complete the dogma, according to the inscription, we must add, "The great Sraman'a hath likewise declared the cause of the extinction of all things." With the help of the commentators, I render this passage thus, "The cause, or causes of all sentient existence in the versatile world, the Tathágata hath explained. The Great Sraman'a hath likewise explained the cause, or causes of the cessation of all such existence."

Nothing can be more complete, or more fundamental, than this doctrine. It asserts that Buddha hath revealed the causes of (animate) mundane existence, as well as the causes of its complete cessation, implying, by the latter, translation to the eternal quiescence of *Nirvritti*, which is the grand object of all Bauddha vows. The addition to the inscription supplied by M. Csoma, is the *ritual application* merely of the general doctrine of the inscription. It explains especially the manner in which, according to the scriptures, a devout Buddhist may hope to attain cessation from mundane existence, viz.

by the practice of all virtues, avoidance of all vices, and by complete mental abstraction. More precise, and as usually interpreted here, more theistic too, than the first clause of the inscription is the terser sentence already given; which likewise is more familiar to the Nipalese, viz. "Of all things proceeding from cause; the cause is the Tathágata:"—understanding by Tathágata, *Adi* BUDDHA. And whenever, in playful mood, I used to reproach my old friend, AMIRTA NANDA, (now alas! no more) with the atheistic tendency of his creed, he would always silence me with, "*Yé Dharmá hetu-prabhava; hetun teshán Tathágata;*" insisting, that Tathágata referred to the supreme, self-existent (*Swayambhu*) BUDDHA*.

Nor did I *often* care to rejoin, that he had taught me *so* to interpret that important word (Tathágata), as to strip the dogma of its necessarily theistic spirit! I have already remarked in your Journal, that the Swobhávika texts, differently interpreted, form the groundwork of the Aiswárika tenets. It will not, however, *therefore*, follow, that the theistic school of Buddhism is not entitled to distinct recognition upon the ground of original authorities; for the oldest and highest authority of all—the aphorisms of the founder of the creed—are justly deemed, and proved, by the theistic school, to bear legitimately the construction put upon them by this school—proved in many ancient books, both Puranika and Tantrika, the scriptural validity of which commands a necessary assent. As it seems to be supposed, that the theistic school has no other than Tantrika authorities for its support, I will just mention the *Swayambhu Purána* and the *Bhadra Kalpavadán*, as instances of the contrary. In a word, the theistic school of Buddhism, though not so ancient or prevalent as the atheistic and the sceptical schools, is as authentic and legitimate a scion of the original stock of oral dogmata whence this religion sprung, as any of the other schools. Nor is it to be confounded *altogether* with the vile obscenity and mystic iniquity of the *Tantras*, though acknowledged to have considerable connexion with them. Far less is it to be considered peculiar to Nepal and Tibet, proofs of the contrary being accessible to all; for instance, the *Pancha Buddha Dhyáni* are inshrined in the cave at *Bágh*, and in the

* The great temple of SWAYAMBHU NA'TH is dedicated to *this* Buddha: whence its name. It stands about a mile west from Kathmandu, on a low, richly wooded, and detached hill, and consists of a hemisphere surmounted by a graduated cone.

The majestic size, and severe simplicity of outline, of this temple, with its burnished cone, set off by the dark garniture of woods, constitute the Chaitya of SWAYAMBHU NA'TH a very beauteous object.

minor temples surrounding the great edifice at *Gyá;* and the assertion of our Ceylonese antiquaries, that there are only five Buddhas, is no other than a confusion of the five *celestial*, with the seven mortal, Buddhas! As I was looking over your Journal, my Newári painter came into the room. I gave him the catch word, "Yé Dharmá," and he immediately filled up the sentence, *finishing with Tathágata.* I then uttered "teshán cha," and he completed the doctrine according to the inscription. But it was to no purpose that I tried to carry him on through De Körös's ritual complement: he knew it not. After I had explained its meaning to him, he said, the substance of the passage was familiar to him, but that he had been taught to utter the sentiments in other words, which he gave, and in which, by the way, the *ordinary* Buddhist acceptation of *Kushal* and its opposite, or *Akushal*, came out. *Kushal* is good. *Akushal* is evil, in a moral or religious sense. Quod licitum vel mandatum: quod illicitum vel prohibitum.

I will presently send you a correct transcript of the words of the inscription, from some old and authentic copy of the *Raksha Bhagavati*, or *Prajná Páramitá*, as you seem to prefer calling it. So will I of De Körös's supplement, so soon as I can lay my hands on the *Shurangama Samádhi*, which I do not think I have by me. At all events, I do not at once recognise the name as that of a distinct Bauddha work. Meanwhile, you will notice, that as my draftsman, above spoken of, is no pandit, but a perfectly illiterate craftsman merely, his familiar acquaintance with your inscription may serve to show how perfectly familiar it is to *all* Buddhists. And here I would observe, by the way, that I have no doubt the inscription on the Dehlí, Allahabad, and Behár pillars is *some* such cardinal dogma of *this faith.*

In the "quotations in proof of my sketch of Buddhism," which I sent home last year, I find the following quotation in proof of the Aiswárika system.

"All things existent (in the versatile world) proceed from some cause; that cause is the Tathágata (Adi Buddha); and that which is the cause of (versatile) existence is likewise the cause of its total cessation. So said Sakya Sinha*.' The work from which this passage was extracted is the *Bhadra Kalpavadán.*

I am no competent critic of Sanscrit, but I have competent authority for the assertion, that Dharmá, as used in the inscription, means not *human actions* merely, but *all* sentient *existences* in the three versatile worlds (celestial, terrene, and infernal). Such is its meaning in the extract just given from the *Bhadra Kalpavadán*, and also in the famous *Yé Dharmanitya* of the *Sata Sahasrika*, where the sense is

* The words bracketed are derived from commentators.

even larger, embracing the substance of all inanimate as well as animate entity, thus: "All things are imperishable," or, "The universe is eternal," (without maker or destroyer.) The passage just quoted from the *Sata Sahasrika* serves likewise (I am assured) to prove that the signification of *yé* is not always strictly relative, but often expletive merely: but let that pass.

The points in question undoubtedly are,—*existence* in the *Pravrittika* or versatile world, and *cessation* of such existence, by translation to the world of *Nirvritti*; and of such translation, animals generally, and not human beings solely, are capable. Witness the deer and the chakwa, which figure so much in Bauddha sculptures! The tales of their advancement to *Nirvritti* are popularly familiar. The word *nirodha* signifies, almost universally and exclusively, extinction, or total cessation of versatile existence; a meaning, by the way, which confirms and answers to the interpretation of *dharmá*, by general existences, entities, and not by merely human actions.

It is scarcely worth while to cumber the present question with the further remark that there *is* a sect of Bauddha philosophers holding opinions which confound conscious actions with universal entities throughout the versatile world, making the latter originate absolutely and *physically* from the former, (see my remarks on REMUSAT in the Journal, No. 33, p. 431.)

It is not, however, admissible so to render generally received texts, as to make them correspondent to very peculiar schismatic dogmata. "*Dháranatmika iti dharmá*," the holding, containing, or sustaining, essence (ens) is *dharmá*. The substratum of all form and quality in the versatile universe, the sustainer of versatile entity, mundane substances and existences, physical and moral, in a word, *all things*. Such is the *general* meaning of *dharmá*. How many other meanings it has, may be seen by reference to a note at the foot of p. 502, No. 34, of your Journal. The root of the word is *dhri*, to hold. WILSON'S dictionary gives *Nature* as AMERA SINHA'S explanation of *dharmá*. This is essentially correct, as might be expected from a Bauddha lexicographer.

Note.—If Mr. HODGSON'S general interpretation of धर्म is the true one, (which seems most probable, though its specification in the sense of *moral duties* is more agreeable to M. CSOMA'S supplement)—its implication, in the present reading, at least, appears manifestly atheistic. For that it cannot mean "Tathágata or the A'di BUDDHA *is* the cause," is evident from the accusative hétún (which is also plural *causas*). Even if we were to strike out the word *avadat* or *áha*—the former of which is on the inscriptions, and the latter repeated in Ceylon—still some word of that meaning is plainly understood: and this may help to shew that the explication given by the Aisvaraka Buddhists (as though the words were हेतुस्तेषां तथ गत: hétus tésham Tathágatas) is a more recent invention,—and that the Buddhist system properly recognizes no being superior to the sage expounder of physical and moral causes,—whose own exertions alone

have raised him to the highest rank of existences,—the EPICURUS of this great Oriental system,

qui potuit RERUM cognoscere CAUSAS,
Atque metûs omnes et inexorabile fatum
Subjecit pedibus.

What is mere figure of speech in the Roman poet, to express the calm dignity of wisdom, becomes religious faith in the east; viz. the elevation of a philosophical opponent of popular superstition and Brahmanical caste, to the character of a being supreme over all visible and invisible things, and the object of universal worship.—W. H. M.

VI.—*Description of two new species of Carinaria, lately discovered in the Indian Ocean. By* W. H. BENSON, *Esq. Bengal Civil Service.*

Class.—GASTEROPODA, Cuvier.

Order.—*Nucleobranche,* Blainville.—*Heteropoda,* Lam.

Fam. *Firolidæ,* Rang.

Genus. *Carinaria ;*—Bory. Lamarck.

Sp. 1. C. Cithara. *Testa dextra ; ultimo anfractu recto, compresso-conico, versùs spiram gradatim et elegantcr attenuato, spiram terminalem ferè amplectente, rugis obliquis ornato ; aperturâ obliquâ, oblongo-ovatâ, versus carinam coarctatâ ; carinâ mediocri, striis sub-rectis signatâ. Habitat in Oceano Indico.*

Shell dextral ; the last whorl straight, compressed, conical, gradually narrowing towards the apex, nearly embracing the terminal spire, marked with oblique wrinkles ; aperture oblique, oblong ovate, narrowed towards the keel ; keel moderate, marked with nearly straight striæ.

The animal of this shell is more narrowed and cylindrical than in any other described species, but as the Carinariæ are said to have the power of inflating themselves, too much stress should not be laid upon this character. The body is attenuated and pointed at the posterior extremity. It is by a line, with not very apparent asperities on the surface, and has a central swimmer (on the side opposed to the shell) ; but I found no appearance of the caudal swimmer, which is represented in the figures of C. Mediterranea. The male organ, and the parts about the mouth are pale crimson. The viscera contained in the shell are brownish, and the stomach yellowish or brownish, passing into red posteriorly. After death, this red colour is often diffused through the neighbouring parts. The scarf skin is very tender, and strips off the animal, soon after death, in ragged portions.

This shell, with that next to be described, approaches in form to the scarce and precious C. vitrea, which is, with good reason, supposed to be an inhabitant of the Indian Seas. Four specimens, of which two were without the spire, were taken by myself and my companions, between S Lat. 4° 30′, and N. Lat. 4° 30′, and E. Long. 87° 30′, and W. Long. 90° 30′. They were all taken after night-fall, and from the eagerness with which we plied our nets after I had made known the value

of our discovery, and our want of greater success, it would appear that this and the following species are scarce, even in that region. Both species, like all the others known, are hyaline, and very fragile. Their spires consist of three whorls. The obliquity of the rugæ of the last or straight whorl, together with its straightness and gradual attenuation, will serve to distinguish Carinaria Cithara from any other species. It is named from its resemblance in form and sculpture to a harp.

Sp. 2. C. Galea. *Testa dextra, ultimo anfractu incurvo, compresso-conico, spiram terminalem ferè amplectente, rugis transversis ornato, latè carinato, carinæ rugis perobliquis, recurvatis; aperturâ transversâ, ovatâ, versus carinam coarctatâ. Habitat cum precedente.*

Shell dextral, with the last whorl incurved, compressed, conical, nearly embracing the terminal spire, marked with transverse rugæ, broadly keeled. Keel with very oblique rugæ, which are curved upwards in the direction of the spire. Aperture transverse, ovate, narrowed towards the keel.

The animal resembles that of the preceding species, but the yellowish or brownish colour in the stomach is replaced entirely by pale carmine. Belonging to the same type as the last species, and resembling in form a compressed helmet, the shell is easily distinguishable by the greater curve of the outer edge of the last whorl, which does not decrease so delicately as in that species, as well as by the less obliquity of the rugæ on the body whorl, and the greater obliquity and curvature of those on its very broad keel. The body striæ being parallel with the edge of the aperture, it follows that in the species under review, the mouth is less oblique than in C. Cithara. Its keel, the close embrace of the spire by the last whorl, and the breadth of the latter at this point, will abundantly serve to distinguish it from C. vitrea. The keels of both C. galea and C. Cithara are from their thinness and excessive fragility, very liable to injury even in their native element.

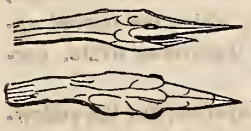
The addition of these two species of Carinaria increases the number known to naturalists to six, the others being C. Mediterranea, fragilis, vitrea, and depressa. Of these one is from the Mediterranean, two from the seas washing the Western Coast of Africa and Madagascar, and the fourth is supposed to belong to the eastern seas.

In N. Lat. 4° 50′, E., Long. 91°. Lieut. McNAIR took two true Carinariæ, the shells of which were replaced by a plate consisting of agglutinated pieces of broken shell, adhering to the suspended viscera. We captured also several species of naked Firolidæ belonging to the genus Pterotrachea.

Calcutta, March, 1835.

VII.—*On a new species of Snake discovered in the Doab.*

A variety of Coluber, undescribed as far as my means of reference allow me to note with regard to the Ophiology of India, having lately come under my observation, it may be worth while to describe the animal, as I observe at page 159 of the 15th vol. of the Encyclopedia Britannica under the head of 'Coluber Mycterizans' a variety described as belonging to North America, very closely resembling that in question. The animal was killed in the dry stony bed of a branch of the Jumna, through which the Doab canal runs, near the Sewálik mountains; its motion, as described to me by the person who killed it, was similar to that of some varieties of caterpillar, who in their progress forwards, elevate the body until the extremities meet, continuing their journey in a system of jerks or steps.



The great peculiarity of this species consists in the proportion of length to breadth, and the extreme prominence of the upper jaw—a sketch of which will be the only way of making it intelligible.

	ft.	in.
Length of animal,	3	$5\frac{1}{2}$
From snout to vent,	2	$2\frac{3}{4}$
Vent to end of tail,	1	$2\frac{3}{4}$
Abdominal plates,	206	
Subcaudal,	170	
Diameter of middle and thickest part of the body,	$\frac{3}{8}$ of an inch.	
Diameter of neck,	$\frac{1}{4}$ ditto.	
Projection of upper jaw over lower,	$\frac{1}{4}$ ditto.	

Color grass green, with a yellowish white line running from the cheek to the end of the tail on each side at the junction at the abdominal and subcaudal plates with the dorsal scales: a double line of the same color running also centrically from the chin to the vent in the centre of the abdominal plates; nose very pointed, and upper jaw extending $\frac{1}{4}$ inch beyond the lower; head flat, one inch long, and $\frac{3}{8}$ inches over the occiput, color of eye raw terra sienna (light); not poisonous, and without fangs.

I subjoin an extract from the Encyclopædia Britannica, as abovementioned.

"Coluber Mycterizans, 'Long-snouted snake;' 192 abdominal plates, 167 subcaudal scales, slender, with a sharp pointed snout: color grass green, with a yellow line on each side of the abdomen. About three feet and a half in length, and half an inch in diameter. Native of North America, where it is often seen on trees, running very quickly in pursuit of insects."

VII.—*Notice of an Extraordinary Fish. By* H. Piddington, *Esq.*

The following notices of a new and monstrous fish may probably be worth recording in the Journal. They do not altogether agree with those of the fish described in your January No., by Lieut. Foley, but there may be more than one species of these monsters.

In December, 1816, I commanded a small Spanish brig, and was lying at anchor in the Bay of Mariveles, at the entrance of the Bay of Manilla. One day, about noon, hearing a confusion upon deck, I ran up, and looking over the side, thought, from what I saw, that the vessel had parted, and was drifting over a bank of white sand or coral, *with large black spots.* I called out to let go another anchor, but my people, Manilla men, all said, "No Sir! its *only* the *chacon!*" and upon running up the rigging, I saw indeed that I had mistaken the motion of the spotted back of an enormous fish passing under the vessel, for the vessel itself driving over a bank! My boatswain *(contramestre)*, a Cadiz man, with great foolhardiness jumped into the boat with four men, and actually succeeded in harpooning the fish! with the common dolphin-harpoon, or *grains*, as they are usually called, to which he had made fast the deep-sea line; but they were towed at such a fearful rate out to sea, that they were glad to cut from it immediately.

From the view I had of the fish, and the time it took to pass slowly under the vessel, I should not suppose it less than 70 or 80 feet in length. Its breadth was very great in proportion; perhaps not less than 30 feet. The back so spotted, that, had it been at rest, it must have been taken for a coral shoal, the appearance of which is familiar to seamen. I did not distinguish the head or fins well, from being rather short-sighted, and there being some confusion on board.

As my people seemed to look upon "the chacon," as they called it, almost in the light of an old acquaintance, which indeed it was to many of them who had served in the Spanish gun-boat service, I made many inquiries of them, of which the following is the result.

1. That there were formerly *two* of these monsters, and that they *lived (tenian su casa)* in a cluster of rocks, called Los Puercos, at the S. W. entrance of the Bay of Mariveles; but that, about ten or fifteen years before this time, or say in 1800, one was driven on shore, and died close to the village in the bay; the inhabitants of which were compelled by the stench to abandon their houses for a time.

2. That the remaining one frequented the bay of Mariveles and that of Manilla, and it was supposed, that it often attacked and destroyed small fishing boats, which never appeared after going out to fish,

though no bad weather had occurred. This last account I afterwards found singularly corroborated.

3. That it was considered as dangerous by the Spanish gun-boats; that they always when there kept a swivel loaded, the report of which, they said, drove it away. My principal informant was a man employed as a pilot for the ports in the Phillippine Islands, whither I was bound, who had passed his whole life in the gun-boats. He said that one instance of its voracity occurred when he was present. A man, who was pushed overboard in the hurry to look at the monster, being instantly swallowed by it.

4. The native fishermen of the Bay of Manilla quite corroborate this account, and speak of the monster with great terror.

About 1820 or 1821, an American ship's boat, with an officer and few men, was proceeding from Manilla to Cavite; but, meeting with a severe squall and thick weather, they were driven nearly into the middle of the bay. They were pulling in what they thought the best direction, when on a sudden the sailors all dropped their oars! But the mate, who was steering, looking astern of the boat, saw the open jaws of a huge fish almost over him! Having nothing at hand, he threw the boat's tiller into the mouth of the fish! shouting as loud as possible; when, the jaws closing with a tremendous crash, the whole fish, which they described to be more like a *spotted whale!* than anything else, dived beneath the boat, and was seen no more. I do not now recollect the names of the ship, or of the captain, but I thought the circumstance of the *spotted* appearance a remarkable proof that the story was not an invention. "We do not like to tell it," said the American Captain, "for fear of being laughed at; but my officer is quite trust-worthy, and we have learnt from the fishermen too, that there is some strange species of large fish highly dangerous to their boats."

Like the American officer, I fear almost being laughed at, were it not that, could we collect more facts relative to these strange monsters, they might perhaps at least explain some of the "coral spots," so often mentioned in our charts*: independent of its being a matter of great interest to the naturalist. I therefore add here a vague notice of monstrous *spotted* fish, which are known in the Moluccas.

These are called by the fishermen of Ternate, Celebes, &c. a "*Ikan Bintang*," (or star-fish,) from the bright light which they occasion, and by which they are recognised at great depths at night, in calm weather. The Malay fishermen describe them too as *spotted*, as large as a whale,

* Horsburgh alludes to shoals of Devil fish. *Lophius* being perhaps mistaken for shoals.

and highly destructive of their nets; which they instantly take up when they see the fish, if they can get time to do so; for it is known to destroy boats, and whole lines of nets and fishing stakes, if it once becomes entangled amongst them, to the ruin of the poor fishermen. I had the same account corroborated at the Soolo Islands, both by Malay and by Chinese fishermen; as also at Zebû, in the Phillippine Islands. At Soolo I was shewn large quantities of the skin of a spotted fish, cut into pieces and dried, for sale to the Chinese junks, which my people said was the skins of young "*chacons*"—"*Pero no son estos como nuestro chacon de allá, Senor.*" "But these are not like *our chacon* yonder, Sir," was always added. This skin I should have called that of a spotted shark*: the tubercles were excessively coarse and rough.

It seems thus certain, that some immense *spotted* fish, of highly destructive propensities, resembling in this respect the gigantic shark of the West-Indies, (which is often known to attack and devour the negroes in their canoes, and recently even a man and boat in Boston Bay,)† exists in the seas of the Eastern Archipelago. It is difficult to say, whether the one seen by Lieut. Foley was an individual of the same species or not. As already stated, I was unable to see mine with sufficient distinctness, to ascertain any thing beyond its enormous size, great breadth, and spotted appearance. I add such conjectures as my limited knowledge and confined means of reference have enabled me to collect: I offer them only *as* conjectures.

We look naturally, from the voracious habit of these monsters, amongst the Rays or Sharks—*Squalus* and *Raja*—for something to throw light upon what they may be; and it appears that, though these two genera have been classed by Broussonnet, Bloch, and Lacepe'de, there is still much uncertainty existing as to some of the known species, "which may be placed indifferently in either genus, for the distinctive characters of the Rays are derived from the flatness of their bodies, and those which are least flattened, and the *squalæ* which are so in some degree, approach much to each other."—Bosc *in Nouveau Dict. Hist. Nat. Art. Squale.* As to their size, the largest individual which has been subjected to trust-worthy measurement seems to be that mentioned by Lacepe'de; a *Squalus maximus*, driven on shore near St. Malo; which was thirty-three feet long, and twenty-four in circumference; but this is far surpassed by the size of those of which, in Europe at

* The tiger shark seems to be rather a *striped* than a spotted shark.

† That some of them are sufficiently formidable, we have lately had evidence. In Boston Bay, a man was recently attacked in his boat, and devoured by one of these animals.—*Encyclopædia Americana, Art. Shark*, 1832.

least, only the fossil remains are found. Bosc, speaking of the SQUALE ROUSSETTE, *Squalus catulus et canicula*, LINN., says of the fossil teeth, "There is in the museum of Natural History at Paris, a tooth, an inch and ten lines long, and two inches nine lines broad; which according to a very moderate calculation, by LACEPE'DE, must have belonged to an individual fifty feet in length! *Art. Squale*, and in another place he says, *Art. Requin*,"—

"The length of the front teeth of a shark thirty feet long is about two inches, and their breadth at the base two and a half; but there is shown at the Museum Nat. His. at Paris, a petrified shark's tooth, found at Dax, near the Pyrenees, which is, also, exclusive of the root, nearly four inches long. The animal to which it belonged must then have been more than sixty feet in length! (LACEPE'DE, from an unquestionable calculation, estimates it at seventy-one feet! and that the jaws were nine feet in diameter!") The authority of LACEPE'DE is so high, that we may fairly conjecture the question of size to be so far set at rest, that Lieut. FOLEY and myself will be acquitted of any exaggeration; and the fact of their swallowing boat and fishermen too, is farther confirmed by BLOCH, (a good authority,) who says, speaking of the preference given by the sharks to putrid flesh, that "the Greenlanders, who frequent a sea abounding in sharks, in little canoes made of the skin of this fish, are careful to make as little noise as possible, to avoid the chance of being swallowed *together with their boat* by these monsters." Its colour is the next remarkable circumstance, and it is worth noticing, that in this all parties agree. The dorsal fin mentioned by Lieut. FOLEY and the lizard-like head I am unable to speak to. It is quite possible however that there may be a genus of these monsters which have the head far less flattened than in general. *Raja rhinobatus*, which seems to connect the two genera, has the snout lengthened.

I suspect the name *chacon* to be a West Indian (Carib or African) one for a shark. I do not find it in any Spanish Dictionary, and I am not aware that it is derived from any of the dialects of the Phillippine Islands. We may hope that ere long some of our whalers may meet with one of these monsters, and thus enable naturalists to form some judgment of what they are. It would be a highly interesting circumstance could we procure some of the teeth, and these should be found to correspond with those at Paris. Perhaps some of your Singapore readers may be enabled to furnish us with more information from the Malay fishermen, if the *Ikan Bintang* is known in those seas.

I had just finished this paper, when I received from my friend Dr. HARLAN, of Philadelphia, the first number of the Transactions of the

Geological Society of Pennsylvania, in which is a most interesting "Critical notice of various organic remains discovered in North America," by Dr. HARLAN. At p. 89, is the following:

"The bones of one species of shark, upwards of forty feet in length, allied to the Carcharias, have occasionally been found in several localities. In CUVIER's Theory of the Earth, by S. L. MITCHELL, p. 400, it is stated, 'The skeleton of a huge animal was found on the bank of the Meherrin river, near Murfreesborough, N. C. It was dug out of a hill distant sixty miles from the ocean. Captain NEVILLE and Dr. FOWLER, who visited the spot, gathered the scattered vertebræ and laid them in a row thirty-six feet in length. If to this the head and tail be added, the animal must have been fifty feet or more in length, &c. We have recognized them as the remains of a gigantic species of shark.'"

He refers to other specimens, indicating sharks of forty feet or more in length; but this will, I doubt not, be sufficient to show that it is quite probable the fish seen by Lieut. FOLEY and the *chacon* of the Bay of Manilla may be individuals of the same family as those only known to us as yet by their fossil remains.

IX.—*Rules for Calculating the Lengths of the Drop-bars of Suspension Bridges, the Length and Deflection of the Chain, Rise of the Roadway, &c.* By Captain J. THOMSON, *Engineers.*

The application of the following problem in statistics, to find the length of the drop-bars and links of a suspension bridge, has, I believe, the merit of originality; while it will be found extremely convenient in practice, in determining at once the requisite proportions, and obviating the necessity of after adjustment, which will always occur where the curve of such a bridge is assumed as a true catenarian.

If a be the angle of suspension,

b the length in feet of one of the links of the chain,

d the number of drop-bars in each chain; then the tangent of the angle a, divided by one-half $d = n = \frac{2 \text{ Tan. } a}{d}$ is the constant difference between the tangents of the angles formed by the links of the chain with the horizon. These tangents will be as follows: upper link $=$ Tan. a, 2nd $=$ Tan. $a - n$, 3rd $=$ Tan. $a - 2n$ &c. and the lowest $=$ Tan. $a - \frac{d}{2} n$. The sines to radius b, corresponding to these angles, are the differences of the lengths of the drop-bars; and the cosines of these angles are the horizontal distances between the drop-

bars, or the spaces which each link of the chain occupies in the span of the bridge. If therefore the sum of these cosines, multiplied by the radius b, be deducted from the span of the bridge, the difference will be the length of the horizontal space occupied by the two upper links; and half of this space, multiplied by the secant of a, will be the length of one of those links. The sum of all the links will be the length of the chain. The sum of the differences of the drop-bars, added to the deflection of the upper link, will be the total deflection of the chain. The roadway may be made to rise with a fair curve, by making the rise bear a certain proportion to the fall or deflexion of the chain.

The sum of the deflexion of the chain, the length of the centre drop-bar, and the rise of the road, will be the height of the point of suspension at the standard.

Example.

$a = 15°$ = angle of suspension.

$b = 5$ feet = length of each link.

$d = 17$ = number of drop-bars.

98.625 = distance between the points of suspension.

3.5 feet = length of centre drop-bars.

The rise of the road = $\frac{1}{5}$ the deflection of the chain.

$$\text{Tan. } a = .2679492 \quad -n = \frac{2 \text{ Tan. } a}{d} = \frac{.535898}{17} = .0315234.$$

1	2 Tang. of deflection	3 Cosines of deflection.	4 Sines of deflection	5 Differ. of drop-bars in ft.	6 Rise of Roadway.	7 Length of drop-bars.
Upper 1st link, ...	.2679492	.....	.2588	2·5418	.5083	
1st drop-bar, ...						9.4580
2nd,.....	.2364258	.9731	.2301	1·1505	.2301	
2nd,.....						8.0774
3rd,.....	.2049024	.9796	.2007	1·0035	.2007	
3rd, ...						6.8732
4th,.....	.1733790	.9853	.1708	.8540	.1708	
4th,.....						5.8484
5th,.....	.1418555	.9901	.1404	.7020	.1404	
5th,.....						5.0060
6th,.....	.1103321	.9939	.1096	.5480	.1096	
6th,.....						4.3484
7th, ...	.0788087	.9969	.0785	.3925	.0785	
7th,.....						3.8774
8th,.....	.0472853	.9988	.0472	.2360	.0472	
8th,.....						3.5942
9th,.....	.0157618	.9998	.0157	.0785	.0157	
Centre drop-bar, ..						3.5000

7.9175 = sum of the cosines multiplied by
5 = × b

39.5875 = horizl. dist. between drop-bars.
49.3125 = ½ span.

9.5250 = difference.

1.0352 × secant of 15°.

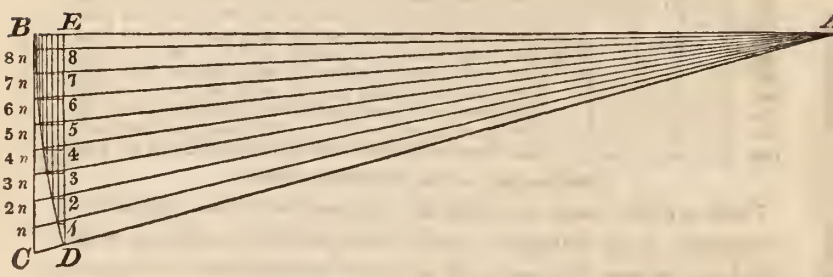
9.8602 = length of upper link.
.2588 = × sine of deflexion 15°.

2.5418 = deflection of upper link.

ft.	in.	ft.	in.	
5	× 16	+ 9.8602	× 2	= 99.7204 length of chain.
The sum of column No. 5				= 7.5068 deflection of ditto.
Ditto			No. 6	= 1.5014 rise of roadway.
7.5068	+ 1.5214	+ 3.5		= 12.5082 height of the point of suspension at standard.

N. B. Column 5 is found by multiplying column 4 by 5 feet.
Column 6 is one-fifth of column No. 5.
Column 7 is equal to columns 5th + 6th + 3 .5 feet.

The geometrical construction of this problem will answer as a proof to the foregoing rule, and will be of assistance in making plans of suspension bridges.



In the right-angled triangle ABC make the angle A = 15° = angle of suspension, and the side AB = 5 feet = length of one link of the chain. Divide the side CB into as many spaces, commencing at C, as there are drop-bars in $\frac{1}{2}$ the space = $8\frac{1}{2}$ spaces, and join A*n* A 2 *n*, &c. From the centre A with the radius AB describe the arc BD, and complete the lines shewing the sines and cosines of the angles formed by the line AB and the radii A*n*, A 2 *n*, A 3 *n*, &c. Then as these radii are parallel to the links of the chain, the sines of the angles E 1, E 2, E 3, &c. are the differences between the lengths of the drop-bars 1, 2, 3, 4, &c. and the cosines of these angles are the spaces which the links of the chain occupy in the space of the bridge. Supposing *n* = length of the centre drop-bar, the other drop-bars will be as follows :

Centre bar *n*.

8th, *n* + E 8.

7th, *n* + E 8 + E 7.

6th, *n* + E 8 + E 7 + E 6, and so on. This does not include the rise of the road, however, which is an arbitrary quantity.

X.—*Table shewing the Weight or Pressure which a cylindrical wrought-iron Bolt will sustain when supported at the ends, and bonded in the middle of its Length. By Captain* J. THOMSON, *Engineers.*

Leng. of bearg.	In. ¼	In. ½	In. ¾	In. 1	Ins. 1¼	Ins. 1½	Ins. ¾	Ins. 2	Ins. 3	Ins. 4	Ins. 6	Ins. 8	Ins. 10	Ins. 12
Wt. in Tons.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. In.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.	Dm. Ins.
2	·57	·72	1·82	·9	·97	1·03	1·09	1·14	1·3	1·44	1·64	1·8	1·95	2·06
4	·72	·9	1·03	1·14	1·23	1·3	1·37	1·44	1·64	1·8	2·06	2·28	2·46	2·6
6	1· *	1·03	1·18	1·3	1·4	1·49	1·57	1·64	1·88	2·06	2·36	2·6	2·81	2·98
8	1·33	1·14	1·3	1·43	1·54	1·64	1·75	1·8	2·07	2.28	2·6	2·86	3·09	3·28
12	2·	1·3	1·49	1·64	1·27	1·88	1·98	2·06	2·37	2·6	2·98	3·28	3·54	3.7
16	2·66	1·43	1·64	1·81	1·95	2·07	2·18	2·28	2·61	2·86	3·28	3·62	3·90	4·14
20	3·33	1*66	1·77	1·95	2·1	2·23	2·35	2·46	2·81	3·1	3·54	3·90	4·20	4·46
24	4·	2·	1·88	2·07	2·23	2·37	2·49	2·61	2·98	3·28	3·76	4·14	4·46	4·74
28	....	2·33	1·98	2·18	2·35	2·49	2·63	2·75	3·15	3·46	3·96	4·36	4·70	4·98
32	....	2·66	2·07	2·28	2·45	2·61	2·75	2·87	3·29	3·62	4·14	4·56	4·91	5·22
40	....	3·33	2·23	2·46	2·64	2·81	2·96	3·09	3·54	3·9	4·46	4·92	5·29	5·62
48	....	4·	2·*5	2.61	2·81	2·98	3·15	3·29	3·76	4·14	4·74	5·22	5·62	5·96
56	....	....	3·11	2·75	2·96	3·14	3·31	3·46	3·96	4·36	4·98	5·50	5·92	6·28
64	....	....	3·55	2·87	3·09	3·28	3·46	3·62	4·14	4·56	5 22	5·74	6·19	6·56
72	....	....	4.	3· *	3·21	3·42	3·60	3·76	4·30	4·74	5·42	5·96	6·43	6·84
80	....	....	....	3·33	3·33	3·54	3·73	3·9	4·46	4·91	5·62	6·18	6·67	7·08
88	....	....	....	3·66	3·44	3·65	3·85	4·02	4·60	5·07	5·8	6·38	6·88	7·30
96	....	....	....	4.	3·54	3·76	3·96	4·14	4·74	5·22	5·96	6·58	7·08	7·52
104	....	....	....	....	3·63	3·86	4·07	4·25	4·87	5·36	6·14	6·74	7·27	7·72
112	....	....	....	....	3·72	3·96	4·17	4·36	4·99	5·49	6·28	6·92	7·45	7·92
120	....	....	....	....	4·*	4·05	4·26	4·46	5·11	5·62	6·44	7·08	7·63	8·10
128	....	....	....	.. .	4·3	4·14	4·36	4·56	5·21	5·74	6·56	7.24	7·8	8·28

Observations on the foregoing Table.

There are two ways in which the bolt may be broken, either by a cross strain, or by detrusion, which is the pulling out the part of the bolt from between the points of support: besides these two ways in which the fastening may be broken, the bolt may crush and cut away the eye of the link which presses upon it.

‡ If w=weight or pressure in tons,

l=length of the bolt between the points of support in inches,

d=diameter of the bolt in inches, then $d=(.37\ w\ l)^{\frac{1}{3}}$ to support a cross strain; but when l becomes less than $\left(\frac{w}{267}\right)^{\frac{1}{2}}$ the bolt will be liable to detrusion, to avoid which, $d=(.08\ w)^{\frac{1}{2}}$. But detrusion can never take place when both the bolt and the link are formed of iron, or the same metal, because when l becomes less than $\left(\frac{w}{71.5}\right)^{\frac{1}{2}}$ the link may be cut by the bolt; to obviate which, the value of d should be $=\frac{w}{24\ l}$. This last equation supersedes the first

‡ These rules are taken from TREDGOLD, the arbitrary quantities assumed by him being corrected by a comparison made, and a mean, taken from the best authorities.

when $w = 71.5\ l^2$. This place is marked * in the table.

Remarks on keys, hold-fasts, &c.

Put b = the breadth in inches,
d = the depth in inches,
w = weight in tons,
l = length of bearing in inches; then the breadth should never be made less than $\frac{w}{24\ l}$, and the section $bd^2 = .37\ w\ l$, or $d = \left(\frac{.37\ wl}{b}\right)^{\frac{1}{2}}$.

As an example, suppose a bar 1 inch square to support 8 tons was fastened by a key; required the breadth and depth?

$w = 8$.—$l = 1$ and $\frac{w}{24\ l} = \frac{}{24} = \frac{1}{3} = b$ or the breadth required,

$\therefore d = \left(\frac{.37 w\ l}{b}\right)^{\frac{1}{2}} = \sqrt{8.88} = 2{\cdot}98$ inches, the depth required.

To support the accuracy of this table, a set of experiments was commenced, but the results from them were so unsatisfactory, that they were not continued. But during the proof of three bridges in which bolts of from $1\frac{1}{4}$ in. to $2\frac{1}{4}$ in. were used, with various lengths of bearing, and pressures of from 20 to 15 tons, the dimensions marked in the table were found sufficiently strong in every instance; but the diameter of the bolt thus given could not be reduced much, or what was the same thing, the length of bearing could not be decreased with out a risk of failure.

The best Swedish iron bolts did not sustain a greater pressure than the ordinary English bolt iron, (rolled, not hammered.) The Swedish iron when strained in excess bent, and became dented as in the marginal figure: the side a was bulged or rose half as much as b was indented or bent, on the other side; when the bolts were formed of English bolt iron (unhammered), numerous cracks opened on the convex surface of the bolts at a and $c\,c$, when the indentation at b amounted to $\frac{1}{16}$ of the diameter of the bolt; the bolt failed by these cracks meeting each other, and the centre part of the bolt was drawn out.

The bars, which these bolts connected, were calculated to sustain 9 tons per square inch of section, and the eyes 7 tons, but when the whole were proved by a tension $\frac{1}{3}$rd greater than the calculated strength, the eyes broke more frequently than either the bars or bolts.

The following table, for which we are also indebted to Captain J. THOMSON, Engineers, will serve as a practical continuation of the observations on roofing, in the last number of the Journal.

XI.—*A Table of the Scantlings of Beams of Teak or Saul Wood, to sustain a Terrace Roof not exceeding seven inches in thickness; the deflexion not to exceed one-fortieth of an inch for each foot of length.*

Distance apart of Beams, one foot from centre to centre.	LENGTH OF BEARING IN FEET.														
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Breadth. Inches.	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches	Depth Inches
0½	6·	8·	10·	12·	14·	16·	18·	20·	22·	24·					
1	4·76	6·35	7·94	9·53	11·1	12·7	14·3	15·9	17·5	19·1	20·7	22·2	23·8		
1½	4·16	5·54	6·92	8·32	9·7	11·1	12·5	13·9	15·3	16·7	18·1	19·4	20·8	22·2	23·6
2	3·78	5·04	6·3	7·56	8·82	10·1	11·3	12·6	13·14	15·1	16·4	17·6	18·9	20·1	21·4
2½	3·5	4·67	5·85	7·02	8·18	9·35	10·6	11·7	12·10	14·	15·2	16·4	17·6	18·7	19·9
3	3·3	4·4	5·5	6·6	7·7	8·81	9·91	11·	12·8	13·2	14·3	15·4	16·5	17·6	18·8
3½	—	4·18	5·23	6·27	7·32	8·36	9·41	10·5	11·5	12·6	13·6	14·6	15·7	16·7	17·8
4	—	4.	5·	6·	7·	8·	9·	10·	11·	12·	13·	14·	15·	16·	17·
4½	—	—	4·81	5·77	6·73	7·69	8·65	9·61	10·6	11·5	12·5	13·5	14·5	15·4	16·
5	—	—	—	5·57	6·5	7·42	8·35	9·28	10·2	11·1	12 1	13·	13·9	14·8	15·8
5½	—	—	—	—	6·29	7·19	8·09	8·99	9·89	10·8	11·7	12·6	13·5	14·4	15·3
6	—	—	—	—	6·11	6·99	7·86	8·73	9·61	10·5	11·3	12·2	13·1	14·	14·9

Burgahs require to be made six times stiffer than beams, in order to prevent cracks in the terrace roof; and as they are invariably placed one foot apart, and have a breadth of three inches, they should be as many inches in depth as they are feet in length of bearing between the beams.

Explanation of the Table, with Examples of its use.

The table shews on inspection the scantlings of beams to support roofs not exceeding 80 lbs. per square foot, including the weight of the timber. It has been calculated, according to the rule in Tredgold's Carpentry, Section II. par. 90, the value of the constant quantity, *a* being taken at ·01. The scantlings given in the table are measured in the middle of the beam; the lower side is supposed to be cut straight, and the upper side with a curve of one or two inches, versed sine, for each 10 feet in length of the beam.

As the stiffest beam that can be cut out of a round timber has its breadth to its depth in the proportion of ·6 to 1 nearly, the proportion of the breadth to the diameter will be as ·5 to 1, or the breadth will be ½ the depth.

As the cost of timber is partly proportioned to its contents, the deeper the beams are made, the cheaper the roof will be within certain limits; and as the cutting of timbers through the heart or centre of the wood is supposed to render the beams more durable, all the timbers should be cut into two beams, particularly as the strength of the timber is not at all reduced by this measure.

There is, however, a proportion between the depth and breadth which cannot be exceeded without the risk of the beam breaking sideways. Tredgold's rule is, (Sec. II. par. 82,) "the breadth in inches should not be less than six-tenths of the length in feet, divided by the square root of the depth in inches."

As the weight on each of the beams is proportioned to the distance between them; and as the strength of the beam is proportioned to its breadth: the breadth in inches, as marked in the first column of the table, must be multiplied by the distance in feet between each beam, measured from centre to centre for the breadth of the beam; or, if the breadth of the beams are given, the distance in feet between them is found by dividing their breadth by the breadth in the first column of the table.

Examples.

A room, 22 feet by 33 feet, has to be roofed in, the timbers provided for which are round, 18 inches diameter in the middle, and 25 feet long. It is required to know the most economical manner of cutting them up, the scantlings of the beams, and their distance apart.

The stiffest beam that can be cut out of an 18 inch tree is 9×15, or if cut into two timbers, $4\frac{1}{2} \times 15$, to ascertain if this timber will be so thin as be liable to break side-ways, the rule for this purpose will be applied as follows: $\frac{.6 \times 22}{\sqrt{15}} = \frac{13.2}{3.87} = 3.4$ in. the least breadth; the beams $4\frac{1}{2} \times 15$, are therefore not too thin. By referring to the table, under 22 feet length of bearing, a depth of 15 inches requires a breadth of $1\frac{1}{2}$ inches. The breadth of the timber, $4\frac{1}{2}$, being divided by $1\frac{1}{2}$, gives 3 ft, the distance from centre to centre of the beams; this distance gives 11 spaces, or 10 beams, or 5 timbers in the 33 ft.

The timbers of the dimensions above stated could be cut into two beams 12.7×6.4, having a greater section than that given above, $15 \times 4\frac{1}{2}$; but on a reference to the table in the column of 22 feet length, and 12·9 in depth, the breadth is $2\frac{1}{2}$ inches, and 6·4, divided by 2·5, gives 2 feet 8 in distance from centre to centre, if beams requiring $12\frac{1}{2}$ spaces, or 12 beams, or 6 timbers.

2nd Example.

Beams $8\frac{1}{2} \times 12$, having been provided for a roof of 22 feet span—required to know the distance they are to be placed apart. In column of 22 feet span, opposite a depth of 12 inches, is a breadth of 3 inches, and $8\frac{1}{2}$ divided by 3, gives 2 feet 10 inches as the distance from centre to centre, at which the beams ought to be placed.

3rd Example.

Proposed to roof a room 18 feet wide, with timber placed 1 foot 3 inches from centre to centre, so as to be covered with tiles instead of burgahs, the deepest timber procurable being 9 inches, required the breadth of the beams.

In the column of the span of 18 feet, and a depth of 9 inches, the breadth is 4 inches, which multiplied by $1\frac{1}{4}$, gives 5 inches for the breadth of the beam.

J. T.

XII.—*On the Temperature of Deep Wells to the west of the Jamna.*

By the Rev. R. Everest.

During the last cold weather and the present, I have paid some attention to the temperature of wells in the country to the west of the Jumna. They are not usually more than 30 or 40 feet deep within a few miles of the river, but beyond Rhotak, about 50 miles to the west of this, on the road to Hansi, they are not less than 110 or 120 feet deep, and, in one instance I have met with (that of the fort at Hansi) 160 feet. Farther than that I cannot speak from examination, but all accounts agree in stating those in the Bikanír country to be the deepest, probably not less than 350 feet. I have almost invariably found the temperature to increase with the depth, but the increase is modified by three circumstances.

1st. By the locality, as in the case of a pool of water being near, or the mouth of the well being broad in proportion to its depth, both which causes tend to lower the temperature in the cold weather.

2ndly. By the season of the year at which the observation is made. The tendency of the rains is to reduce all wells to the uniform temperature of 78°, which is about that of the rain-water when it falls. From this cause the deep wells are at their minimum about the autumnal equinox, and get warmer during the cold weather. On the contrary, the more superficial ones become colder during the same period.

3rdly. By the quantity of water that is drawn from them. Those that are not used are usually the lowest, and those where oxen are working for the purpose of irrigation by a great deal the highest. I have only to premise further that the mean temperature of the year here, according to Major Oliver's observations, is 76°. The general results I have obtained are as follows:

No. of wells.	Depth to bottom.	Temperature at the bottom.
1. Mean of 10 observations made at nearly equidistant periods throughout the year,	42 feet.	78·6
3 observations,	60	79·2
6 ditto,	80 to 100	79·0
5 ditto,	110 to 120	79·8
1 ditto,	160	80·0

The increase in Europe is said to be 1° centigrade, or 1°· 8 Farht. for every 35 or 37 metres (about 105 or 110 feet English), of depth. Were I to select from my observations those made where bullocks were working for the purposes of irrigation, the increase would be much more rapid than what I have above stated. Thus:

No. of wells.	Depth to bottom.	Temperature.
2	60	81
3	90	81·9
2	120	82·7

I do not publish these observations with the idea that they are sufficiently numerous to establish any general law on the subject for this country, but because my avocation here does not permit me to extend them, and in the hope that some one who may hereafter travel through the Bikanír country may be induced to take up the subject, for there alone can any considerable depth beneath the surface be attained.

P. S.—Lieutenant TREMENHEERE, of the Engineers, in leaving this on the Shekawatti campaign, had the kindness to promise that he would make some observations on the temperature of the deep wells that lay in his route, and this he has performed with great zeal and assiduity. He has now placed the results he obtained in my hands, and I have drawn up the following abstract of them:

No. of Wells observed.	Depth.	Aver. Temp.
13....	40 to 80 feet.	78°
6....	80 to 120	79°. 4
4....	120 to 140	81°

These observations were made throughout a large tract of country lying between 28 and 26° N. Lat. and 78 to 76° E. Long. And the time of the year in which they were made was from the 26th October to the 28th February. The mean temperature of the year for the surface may be reckoned at 75°, if, as stated by Lieut.-Col. OLIVER, that of Dehli be 73°. 4.

I see that in the above paper on this subject I have misquoted this same datum of Colonel OLIVER's, calling it 76°. I took the number carelessly from the wrong column, owing to its suiting so well to Dr. ROYLE's observations at Seháranpur, who makes the mean of that place, I believe, 73°. 5. One or other of the two observations must now be rejected.

XIII.—*Abstracts of a Meteorological Register kept at "Caineville," Musooree (Masúrí.) By* S. M. BOULDERSON, *Esq.*

1834.

		Bar.	*Therm. attd.*	*detd.*
From 15th to end of May,	8 observations at 10 A. M.	23.919	75	78.1*
	9 ,, at 4 P. M.	23.894	75.6	79.5*
	10 ,, at 10 P. M.	23.905	74.8	75.7

Mean temperature at 10 A. M. and 10 P. M. 76°9.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(6 obsrs.)—0.043	—0.060	—0.026	(7 obsrs.)—0.034	—0.066	0.004

		Bar.	*Therm. attd.*	*detd.*
June,.....	25 observations at 10 A. M.	23.897	71.8	70.3
	22 ,, at 4 P. M.	23.815	71.4	71.1
	23 ,, at 10 P. M.	23.870	71.5	68.0

* I think that the temperature at 10 A. M. and 4 P. M. was considerably raised by reflection. This was modified or obviated in the subsequent months.

Mean temperature at 10 A. M. and 10 P. M. 69°1.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(18 obsns.)—0.073	—0.212	+0.040	(18 obsns.)—0.048	—0.210	+0.014

			Bar.	*Therm. attd.*	*detd.*
July,	25 observations	at 10 A. M.	23.896	69.9	67.5
	13 ,,	at 4 P. M.	23.830	69.2	68.5
	28 ,,	at 10 P. M.	23.879	69.6	67.2

Mean temperature at 10 A. M. and 10 P. M. 67°35.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(12 obsns.)—0.058	—0.112	+0.032	(12 obsns.)—0.043	—0.104	+0.062

			Bar.	*Therm. attd.*	*detd.*
August,	25 observations	at 10 A. M.	23.917	69.1	68.5
	19 ,,	at 4 P. M.	23.864	68.3	67.5
	28 ,,	at 10 A. M.	23.900	68.9	66.4

Mean temperature at 10 A. M. and 10 P. M. 67°4.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(17 obsns.)—0.060	—0.090	—0.022	(16 obsns.)—0.023	—0.066	+0.018

			Bar.	*Therm. attd.*	*detd.*
September,	25 observations	at 10 A. M.	23.994	67.7	67.2
	13 ,,	at 4 P. M.	23.918	67.5	66.8
	24 ,,	at 10 P. M.	23.960	68.1	65.5

Mean temperature at 10 A. M. and 10 P. M. 66°35.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(12 obsns.)—0.064	—0.106	+0.006	(11 obsns.)—0.031	—0.086	+0.036

			Bar.	*T. attd.*	*detd.*
October,	23 observations	at 10 A. M.	24.084	61.5	62.2
	19 ,,	at 4 P. M.	24.012	61.5	61.96
	20 ,,	at 10 P. M.	24.050	61.8	58.63

Mean temperature at 10 A. M. and 10 P. M. 60°41.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(17 obsns.)—0.072	—0.140	—0.032	(16 obsns.)—0.043	—0.128	—0.008

NOTE.—From the 2nd to the 9th, no observations taken.

			Bar.	*T. attd.*	*detd.*
November 1st to 21st. ..	17 observations	at 10 A. M.	24.158	57.5	57.4
	10 ,,	at 4 P. M.	24.104	57.6	56.4
	19 ,,	at 10 P. M.	24.128	57.8	53.9

Mean temperature at 10 A. M. and 10 P. M. 55° 6.

Bar. at 4 P. M. compared with 10 A. M.			Bar. at 4 P. M. compared with 10 P. M.		
Mean diff.	*greatest.*	*least.*	*Mean diff.*	*greatest.*	*least.*
(9 obsns.)—0.052	—0.074	—0.026	(10 obsns.)—0.034	—0.058	—0.014

Mean of the mean temperatures from 15th May to 21st November, 66°17.

Height of Caineville, by comparisons with Calcutta Barometer.

	Above Calcutta.
By mean of 80 observations at 10 A. M. from 16th May to 31st August, ... feet	6287.5
By mean of 49 observations, at 4 P. M. do. do.	6285.9
By mean of 30 ditto, at 10 P. M. July to August, ...	6274.7
Mean,	6282.7
By 61 observations, Caineville above Seharanpur, ...	5346.7
Seháranpur above Calcutta, ...	1012.3
	6359

XIV.—*Proceedings of the Asiatic Society.*

Wednesday Evening, the 6th May, 1835.

Captain M. G. White, Senior Assistant Commissary, Arracan, proposed at the last Meeting, was duly elected a member of the Society.

Professor Lea and Dr. R. Harlan, of Philadelphia, proposed as honorary members at the last Meeting, were upon the favorable report of the Committee of Papers, balloted for and duly elected.

Read the following report of the Committee appointed, at the last meeting of the Society, to consult with the Baron Hugel on the expediency and on the best means of procuring from Europe a competent Curator for the Museum.

"Although the measure of sending to Europe for a qualified curator would ensure the establishment of a museum in Calcutta, upon a footing such as has not hitherto been known here, and perhaps on a par with those in more favorable climates; and although the unexplored and extensive field around us promises an ample store of novelties, such as would render our museum in time an object of attention to naturalists both here and at home, still it cannot be concealed that there are several points of view under which the scheme of procuring a curator from Europe does not appear the most favorable for the end to be accomplished.

"The Baron Hugel has favored the Committee with his opinion, that a competent naturalist, that is, a person acquainted with the branches of Zoology, might be induced to accept the situation on a salary of 200 rupees a month. By making this sum payable from the day of his embarkation from Europe, a separate allowance for passage money and outfit might perhaps be obviated, and a similar provision might be made in case of his return home: The Baron's recommendations through his friends at Vienna or Paris, would also be a guarantee that the person selected should meet the Society's expectations, and faithfully perform the duties assigned to him, while health should last: but he must necessarily incur much expence on his leaving his own country; he would here be altogether dependent on the Society in case of sickness, or he might become a burden, were he to prove inadequate to perform his duty. It could not be expected that the same individual should be a mineralogist or a geologist: these branches therefore (and they are important to us,) would still be deficient. Again, though he might learn a little English on his way out, he would hardly be able to write descriptions, for publication, of the new objects of Natural History, which might fall under his notice.

"These considerations have led your Committee to listen favorably to a modification of the original plan, which offers the opportunity of providing a curator on the spot.

"Dr. Pearson, your late honorary curator, in resigning this situation a short time since, stated that he had found it impossible to do much hitherto for the museum, while acting gratuitously: his distance from the premises: his attention to his own collection, naturally interfered to prevent his attention being given to a secondary object. These difficulties would however be in a great measure removed were he to receive such allowance as the Society might determine to devote to the purpose of creating and maintaining a museum: indeed he would be willing to accept the office at 150 rupees per month, which would be a positive saving of 50 to the Society, a material consideration in the actual state of its finances: This sum would enable him to take a house near the spot, or to procure the means of conveyance till he could get one suitable: it would purchase as it were his exclusive services: for it he would consent to relinquish the further prosecution of his own private collection, and to devote his whole leisure to the Society's museum. On the other hand, being in the Company's Medical Service, he could at no time become a burthen to the Society, which would be at liberty to annul its engagement with him at any time, should a fair trial prove that the object of forming a creditable museum was not attained, or was no longer desirable.

"Your Committee therefore is unanimous in recommending, in modification of the resolution of the 1st April, that the services of Dr. PEARSON be secured at the rate of 150 rupees per mensem, for a limited term at first, say one year, at the expiration of which it would be seen whether or not it would be desirable to continue the system, or to have recourse to the obliging assistance of the Baron HUGEL to procure a regular curator from Europe."

(Signed) E. RYAN.
W. MORRISON.
W. H. MACNAGHTEN.
J. T. PEARSON.

After some discussion, it was resolved; that the Society should avail itself of the services of Dr. J. T. PEARSON as curator, and that a sum of 200 rupees per mensem should be devoted to the purposes of the museum for the period of one year: the 50 rupees excess being intended for contingencies, cabinets, &c. or for an assistant, for the office of which M. BOUCHE' of Chandernagore was an applicant.

A letter from J. B. GARDNER was read, proposing to repair the monument of Sir W. JONES, in the church-yard, for rupees 250. Referred to the Committee of Papers.

Read a letter from Mr. J. K. KANE, Secretary of the American Philosophical Society, forwarded by Mr. T. RYAN, acknowledging the receipt of Part 2nd of volume xviii. of the Asiatic Researches.

Library.

Read a letter from Monsieur M. D'AVEZAC DE MACAYA, Secretary to the Geographical Society of Paris, &c. &c. presenting two pamphlets.

1.—"Examen et Rectification des Positions determinés Astronomiquement en Afrique par Mungo Park."

2.—"Notice sur L'apparition nouvelle D'un Prophête Mussulman en Afrique."

The following books were also presented.

Transactions of the Medical and Physical Society of Calcutta, Part 2 of volume vii.—*by the Society, through Dr.* HUTCHINSON, *Secretary.*

The Indian Journal of Medical Science, volume 2nd, Nos. 16, 17—*by the Editors.*

Madras Journal of Literature and Science, No. 7—*by the Madras Literary Society.*

SCOTT WARING'S Tour to Shiraz by the route of Kazroon and Feerozabad—*by* H. N. THAKUR.

Meteorological Register for March, 1835—*by the Surveyor General.*

Dr. R. HARLAN'S Fauna Americana, presented for the author—*by Mr.* H. PIDDINGTON.

Antiquities.

A letter was read from Mr. J. B. ELLIOTT, Commissioner of Patna, forwarding an impression taken in sheet-lead of an inscription on the plinth of some figures of the *Avatars*, sculptured on a black stone which he obtained at Kesariah in the neighbourhood of the mound depicted in the last No. of the Journal.

A note on the interpretation of the line was read by the Rev. Dr. MILL.

Extracts of a letter from Captain WADE were read, communicating interesting accounts of further progress made by M. MASSON in his exploration of the Afghán topes.

Extracts of letter from Mr. Masson to Captain Wade, dated the 15th July, 1834.

"I had the pleasure of addressing you from Pesháwar about the middle of May, and now avail myself of a Cossid proceeding to Cabúl to transmit through your Agent MEER SYAD KARAMAT ALI, a brief account of my proceedings since that time.

"In three or four days after I wrote you, I left Pesháwar for SÚLTAN MAHOMAD KHAN'S Camp at Sheikan, and thence proceeded to Jalálabad by the route of Abkanu. On arrival there, I recommenced operations on the topes remaining in that vicinity, and these labors have fully occupied me until this time, and continue to do so.

"I rejoice to say that very fair success has attended my operations; of seven unpromising topes, as to appearance, opened near Chaharbágh of Jalálabad, four yielded results satisfactory, one of which will be interesting from the coins therein discovered. Of fourteen topes and tumuli opened at Hiddáh, the greater portion have alike yielded the wished-for results in relics and medals; one produced a very splended collection of relics and a great number of coins, the major part silver Sassanian, but also seven gold ones, of which singular to relate, are five of *Roman Emperors*, two of THEODOSIUS, two of LEO, and one of MARCIANUS. These coins are themselves curious, and the discovery of them in such a place is not less so, and they may be of great use in assisting to ascertain the epoch when the monument containing them may have been built.

"I note the legends of the coins*, I have discovered for your information, and when I receive your reply to this letter, shall forward to Mr. PRINSEP, for publication in his Journal, an account of this interesting tope, and of the relics and coins extracted.

"I continue to hear of or to fall upon others of these monuments in a variety of situations, and as their importance is obvious, shall not relax in the pursuit of their identification: they will fully occupy me until the winter, therefore I must defer a visit to the countries north of the Hindu Kush until the next season.

"*The 30th September*, 1834. Nearly a month since I arrived in Cabúl and took in hand a tope which had been opened and abandoned by M. HONIGBERGER, at a spot called Gool Durah: from this were extracted eight fine gold coins with etcetera, seven of them of the king KADPHICES: the eighth of a prince of the same family. I am now in the Kohistan for the purpose of operating on two topes in critical spots, availing myself of the presence of MAHMAD AKBAR, DOST MAHOMED KHAN'S son. My collection of coins this year will far exceed that of the last, and I have found several new ones. Last night I procured a copper Menander of very large size, and at Cabúl I gained a silver one more large and beautiful than any that I have seen or heard of. When the year's labors close I shall draw up the result, and I hope to be able to identify another Greek monarchy distinct from those of Bactria and Nysa."

In a letter to Colonel POTTINGER, M. MASSON gives further particulars of the Hiddáh Tope. "The relics found there comprise a handsome gold box with cover set with gems, and at the top a fine blue stone; this was originally filled with a liquid perfume, in which musk predominated. This box was enclosed in a larger silver one: with this was also a smaller silver one, containing four Sassanian coins, one or two gems, and an unctuous substance. The whole was contained in a box of iron, gilt, and this again was enclosed in a large copper vessel handsomely washed with gold, which was half filled with a liquid mixed with earth and impregnated with the oxyd of copper. In this copper vessel were 180 silver Sassanian coins, and two golden, probably Hindu, with three copper ones of Koveen (?) types. In the iron gilt box were three *golden Roman coins*, and in the golden box within it, two others of THEODOSIUS; the former were one of MARCIANUS and two of LEO. In the copper vessel moreover were two gold rings, on one of them the gem engraved with the head of a sovereign, and among the detached gems is another one engraved. Besides the gold ones there is a multitude of plain silver ones, and a variety of fragments of ornaments: upon the whole this has been the richest prize yet produced from any of the topes opened."

[M. MASSON'S correspondence with Col. POTTINGER, with a sight of which we have been favored, contains lists of all the relics hitherto collected by him, and held at the disposal of the Bombay Government, in consideration of the

* As we may expect a full account hereafter, it is needless to insert the legends here; they are evidently genuine Roman coins.

pecuniary assistance accorded him through Colonel POTTINGER. The number of coins sent to this officer amounts to upwards of 2220. They could not be in better hands, and we trust soon to hear of their introduction to public notice with the advantage of his learned elucidations. The number of topes excavated up to the present moment has been in Durconter, 10; at Chaharbágh 7; and at Hiddáh 14. Mr. MASSON's promised communication to ourselves will, without doubt, contain the particulars of all these.]

A notice by Mr. B. H. HODGSON on the Sárnáth inscription was communicated.

[Printed in the present No.]

Physical.

A letter from Colonel CASEMENT, Secretary to Government, Military Department, was read, forwarding an extract of a dispatch from the Honorable Court of Directors, expressive of the interest taken by them in the experimental boring in Fort William, for the successful prosecution of which they have caused a supply of tubes and rods to be sent out; and directing a full report on the further progress of this interesting object of public utility. The following *memorandum* on the Society's report by the H. C. Inspector of military stores was appended.

Memorandum on the subject of Boring for water, with reference to the Report of a Committee appointed by the Asiatic Society of Calcutta upon experiments made at Fort William, for the purpose of obtaining a supply of potable water.

"In submitting a statement herewith, of the pipes, rods and tools for boring for water, now under supply for Bengal, in addition to the ten sets of boring apparatus provided upon the indent of 18th December, 1832, I beg to observe, that anticipating the objection made to the length of the rods formerly supplied to Bengal, viz. six feet, I had already caused those for the ten sets furnished upon the indent above mentioned, to be made in lengths of 10 feet each, and have now determined upon making the additional rods to be provided, in lengths of 20 feet, similar to those sent to Madras, and Bombay. If these lengths are found to be more generally useful than the old ones, the short rods which the Bengal Government at present possess, can easily be lengthened by cutting them in two, and welding in the centre of each a piece of the length required.

"As the screws of each description of rods are exactly similar in the thread, they may be used together, which will enable the operators to penetrate to any depth the soil, &c. will permit.

"With regard to the pipe, so necessary to the successful prosecution of the work, (and the want of which has been so much dwelt upon,) 1000 feet of cast iron pipe has been provided of the following interior dimensions, viz. 8 inch, 6 inch, and 4½ inch; which will admit of the one being passed through the other, but as it will not be necessary to use cast iron pipe the whole depth, sheet iron pipe (which can be readily made upon the spot of any size required) should be used wherever it may be practicable. Two lengths of these of 5½ inch diameter are sent as patterns.

"With regard to the alleged breakage of augers; the second page of the *Report of the Committee* appointed by the Asiatic Society, forwarded from Bengal, presents an abstract of the several experiments in boring: from which it would appear, that in no less than eleven instances the work was given up in consequence of the auger breaking, and in no one case the rod. I am inclined to think there must be some mistake in this, for from the formation of the auger it is scarcely possible to break it in the act of boring, it being stronger than the rod. In the seventh page of *Dr. Strong's Report*, allusion, however, is made to *two* instances in which the rods broke and remained in the ground; and in the ninth page, he again mentions, that the borer broke, and 91 feet of rod were lost. From this I infer, that in most of the instances of failure, it was the rod, and not the auger that broke; and that the accident would probably not have occurred, had

the jumper and drill been used before the auger; or if it had occurred, that the broken rod might have been extracted by means of a proper tool.

"The Diagram and plan alluded to in the Report, have not been forwarded to England, which is to be regretted.

"Upon the whole, it does not appear that the results of these experiments, to such extent as they have been carried, are at all discouraging, or that the failures attending their progress have been more than might have been expected, considering the defective knowledge of boring in the early stages of the operation at Calcutta, the deficiency of tools for piercing the various strata, and the want of pipes to prevent the falling in of sand, or the irruption of the land springs.

"The progressive improvement in carrying on the work, is evinced by the fact, that the same depth has of late been attained in six months, that formerly occupied two years. It may therefore reasonably be hoped, that upon being provided with further facilities, and such tools as experience in this country has shewn to be necessary, the undertaking if vigorously prosecuted will eventually be crowned with success.

(Signed) "J. T. Bonner, *Inspector.*"

A letter from Major J. Colvin, Engineers, dated 11th April, 1835, announced the dispatch of six chests of fossils from the lower hills, in furtherance of his promise to present the result of his labors to the Society's Museum.

[These will be noticed further on arrival.]

A letter from Conductor Dawe, Delhi Canal Department, dated 17th April, noticed the discovery of a fossil Buffalo's head of large dimension, found in the vicinity of the Haripur pass, in the lower range of hills. A sketch accompanied, and Mr. Dawe expressed his willingness to present the specimen itself to the Society.—Accepted with thanks.

A Memoir on the strata and formation of the alluvium of the Jamna and Doab, with numerous drawings and sections, was received from Sergeant Dean, in illustration of the series of specimens presented in his name at the last Meeting.

[This paper will be published in an early number.]

Further observations on the moon's influence on rain were submitted by the Rev. R. Everest.

J. T. Pearson brought forward a motion to the following purport:

"That the committee of papers be requested to consider the propriety of admitting a new order of members into the Society, to be called *Associate Members of the Asiatic Society*, and to consider upon the terms of their admission."

The object of this resolution, he explained, was to obtain the assistance of many scientific men who were now prevented from joining the Society by their inability to pay the quarterly subscriptions. The dignity of Honorary Membership should be reserved for those distinguished orientalists out of India whose contributions to our Transactions or our Library, or whose successful promotion of the objects of the Asiatic Society, should merit such a reward. The grade of *associates* would merely imply admission to all the privileges of ordinary paying members, conferred upon those whose labours would be valuable in their respective departments, and who were unable to pay. It was so understood in the Linnean Society, which derived material aid from its associate members.

The resolution was seconded by Mr. W. H. Macnaghten and adopted by the meeting.

The Secretary called the attention of the Society to the late important resolution of the Government, suspending the printing of all the Oriental works hitherto in the course of publication under the auspices of the General Committee of Public Instruction.

He had ventured to bring forward a motion on the subject at the last meeting, but had withdrawn it, under the impression that it was premature, and that

Government might be induced to reconsider the effect of such a measure. He however now held in his hand a copy of the order to the Printers, directing them to discontinue all the works in hand (with one exception), and to dismiss the establishment hitherto entertained for the transcription and collation of MSS., and for the correction of the Sanscrit and Arabic Press.

The principal Sanscrit works thus consigned to sudden destruction were:

1st. The *Mahábhárata*, expected to form five quarto volumes, and printed nearly to the middle of the 2nd volume, 1400 pp., or little more than one-third of the work.

2nd. The *Rájatarangini*, comprising one quarto volume of 620 pages, of which about 200 remain to be printed.

3rd. The *Naishada*; of this 600 pages or rather more than one-third have been executed.

4th. The *Susruta*, to occupy 2 vols. royal octavo. Of these 714 pages, forming the first volume, and three-fourths of the second, are already printed.

5th. The *Sarírak vidya*, a translation of an English work on Anatomy into Sanscrit, of which 20 pages remain unprinted.

Of Arabic works, the order of Government will extend to

6th. The *Fatáwa Alemgíri*, of which one-half of the sixth and last volume, only, is deficient. (The Committee of Education have however recommended this work to be completed.)

7th. The *Khazánat al Ilm*, a valuable exposé of European mathematics in Persian, of which 500 pages are printed, and 106 remain.

8th. The *Ináya*, of which the last two volumes are priuted, and 450 pages of the second volume. 150 pages of the latter, and the whole of the first volume (of which a correct manuscript has with great difficulty been obtained), remain to be printed.

9th A treatise on Algebra by Dr. Mill, proceeding on the basis of a translation of Bridge's Treatise, but much modified and enlarged; with an Appendix on the application of analysis to geometry and trigonometry. The two first parts to the end of plane trigonometry are finished: but a continuation of the Appendix to spheries remains to be passed through the press.

Many other works might be enumerated, particularly the translations into Arabic of Hutton's Mathematics, Hooper's Vademecum, and Crocker's Land Surveying, by Dr. John Tytler, which are left in an unfinished state. But prospectively, the interdiction extends to all the Oriental classics selected by the late Committee and by Mr. Wilson as eminently fit to be preserved in a printed form. The Rámáyana, and some of the Puránas; the Mugdhabodha, with commentary, and other works on Grammar; various standard treatises on Law, Rhetoric, and Logic; and eventually, the Vedas themselves:—also the standard Bauddha works in Sanscrit brought to light by Mr. Hodgson*; the Surya Siddhánta, and the works of Bha'skar A'cha'rya, urgently recommended for publication by Mr. Wilkinson; and a vast number of others which might have been gradually undertaken as the means of the Committee should permit.

Without entering into any discussion as to the propriety of the measure as regarded the great object of Education, he deemed it his duty as Secretary to bring to the notice of the Society a resolution fraught with such destructive results to the ancient literature of the country, and opposed so sternly to the interests and objects of the Asiatic Society, which seemed called upon not only to remonstrate, but in every way to exert its influence to save the venerable fabric of Indian literature from such a catastrophe, and to rescue our national character from the stigma of so unjust, unpopular, and impolitic an act, which was not

* A friend has pointed out to me the following passage of a letter published by Lieut. Webb in a Calcutta periodical in the year 1823.

"You are yet all in the dark, and will remain so, until you have explored the grand libraries of Patan, a city in Rájputana—and Jesselmere, a town north-west of Joudpur—and Cambay; together with the travelling libraries of the Jain bishops. These contain tens of thousands of volumes, and I have endeavoured to open the eyes of some scholars here on the subject. At Jesselmere are the original books of Bhauda (Buddha), the Sybilline volumes which none dare even handle. Until all these have been examined, let us declare our ignorance of Hindu literature, for we have only gleaned in the field contaminated by conquest, and where no genuine record could be hoped for."

far outdone by the destruction of the Alexandrine library itself! But it could not be supposed, that the Government of a great country could mean to withdraw its support and patronage altogether from the indigenous literature of India, however it might have determined to separate this object from the business of the Committee of Public Instruction, and to confine the efforts and the funds of the latter to the support and superintendence of schools and purely normal education. It only required a public body, independent of such functions, and offering a guarantee of competency for the task, to step forward and solicit to be entrusted by the Government with this momentous object. None could so properly proffer its services as the Asiatic Society, supported by all the eminent Orientalists of the country: he had already the assurance of many both in Calcutta and in the interior, that they would cordially join. He would then move the following resolutions:

"1st. That a Committee be formed in the Asiatic Society, to be called the "Oriental Publication Committee," consisting of the President, Vice-Presidents, and Secretaries as ex-officio members, and of such members as may express a desire to join it; as well as of all distinguished Oriental scholars, or patrons of Oriental literature, Europeans or natives, resident in India, who not being members of the Asiatic Society may be desirous of joining in the objects of the Committee.

2nd. That the Governor General be requested to accept the office of Patron.

3rd. That no monthly contribution shall be expected from ordinary or from associated members, but that subscriptions for specific objects may be occasionally invited, as may be determined on in committee.

4th. That the principal object of the Association is the completion of the publication of those Oriental works which have been hitherto printed under the auspices of the Committee of Public Instruction; but which, by a late resolution of Government, have been suspended, in order that the funds devoted thereto, might be wholly appropriated for purposes of Education by means of the English language.

5th. That the Asiatic Society do present an humble but urgent Memorial to the Government of India, or if necessary, to the Court of Directors, setting forth the great national importance of continuing the publication of the series of Oriental classical literature it had commenced; the high value set upon this undertaking by all the learned of Europe; the difficulty of re-organizing the same establishment, or one equally well trained for conducting through the Press any Sanscrit or Arabic works, if the Pandits, Maulavís, and compositors now employed be discharged and dispersed;—and soliciting, therefore, that the Government will still continue its patronage to these Oriental works, granting as a separate boon a sum of money equivalent to what has hitherto been expended, or such sum as may be sufficient for the object, and placing its expenditure under the Asiatic Society, or the Oriental Committee, with such means of audit or control as may seem advisable, to prevent misappropriation.

6th. That the Society will engage to devote its attention gratuitously to the careful and creditable execution of the important charge entrusted to it.

7th. That it will bring to the notice of Government other works which are worthy of being printed, and use its utmost exertion to secure the careful collation of manuscripts and correction of the press.

8th. That it requests of Government the same advantages as the Committee of Education has hitherto enjoyed for this purpose, in the use of the Pandits and Maulavís of the Pátsálá and Madrassá.

9th. That the Oriental Translation Branch of the Royal Asiatic Society of Great Britain be invited to unite with the Committee, as far as they have a common object in view, namely, that of placing in a permanent form the ancient classical literature of the country—by the printing of standard editions, with or without translations in the English or Latin language. That to that end the Oriental Fund Branch Committee of Calcutta might properly merge into the new Association."

The Secretary concluded by reading a letter from Mr. Hodgson, Resident in Nipal, whose experience of the natives, and acquaintance with Bauddha and Brahminical literature, entitled his opinions to the utmost respect. [We may perhaps find room hereafter for the insertion of this letter at length.]

Mr. W. H. Macnaghten thought it would be useless in the Society to form a Committee, until it were assured that Government would grant the same pecuniary support as heretofore, or at any rate, a sufficient aid; he would therefore first propose that a memorial should be presented to Government, or if necessary, to the Court of Directors, expressiug the sentiments of the Society as a body, on the late resolution, and praying to be allowed to continue the suspended publications at the public expence, in case no other arrangement was contemplated for their completion.

His own view of the effects of the measure on the education of the people, he had expressed in another place—but he could not consent to relinquish these arguments in an appeal from the Society, which was as much as any body open to conviction that the improvement of the vernacular dialects, nay the very grammatical formation of them, required the cultivation and preservation of the parent and classical languages.

The Rev. Dr. Mill entirely concurred in these views. To discourage systematically the study of the learned languages of the east,—was, as far as in us lies, to barbarize the native dialects, and render them incapable of being the vehicles of science and improved knowledge. This capability was now eminently possessed by many of them, entirely through their natural connexion with the Sanscrit, an advantage which it was chimerical to think of supplying by means of artificial and exotic derivation from the English. Another observation had forcibly struck him with respect to the late measure. There were *two* distinct classes of publications overthrown by it, of which he feared only one would or could be provided for by the Society's proposal; namely, the perpetuation of the most venerated monuments of Sanscrit, Arabic, or other oriental literature,—but the other class, comprising the 5th, 7th, 8th, and 9th of the works enumerated above, which are intended to communicate the advanced knowledge and science of Europe, through the medium of the learned languages of India, either by translations or original treatises, and thus indirectly, but most powerfully, to encourage the study of English among learned natives, fell peculiarly under the scope of an Education Committee. It did not come within the Asiatic Society's proviuce to attempt this, otherwise than by commenting on existing native systems of science; and although the object was so important as to warrant some latitude in the exercise of its proposed functions, it seemed doubtful whether they could properly undertake the completion of the four works thus suspended, already prepared and half printed at so great an expence.

Mr. Trevelyan came purposely to support the formation of the new Committee. He thought the preservation of standard editions of the classics of the country a national object, although he had done his utmost to disconnect it from the business of national instruction. He had himself had a narrow escape of being a great orientalist, for he had attained some credit for his progress in Sanscrit at College: but his Dictionary fell overboard on his voyage to this country, and thus he was saved from the bias which an enthusiastic devotion to this ancient tongue might have given to his views of education.

The President thought, it would be proper to confine the object of the Society's motion, to the simple question of the completion of the oriental works, which it was given to understand had been discontinued. He also agreed with Mr. Macnaghten, that the first step must be to ascertain whether Government would continue its support, and to what extent; for this he recommended, that Mr. Macnaghten and Dr. Mill should be requested, in conjunction with the Secretaries, Mr. J. Prinsep and Bábu Ram Komel Sen, to draw up an urgent memorial to the Government, avoiding to the utmost all controversial points, and to submit it for the approval of the Society at the next meeting.

This proposition was unanimously agreed to.

[The meeting was less numerously attended than usual, in consequence of the usual notices to members having been omitted. At the last meeting it was directed, "that in future the day of meeting should be fixed regularly for the first Wednesday of every month, and that notice should be only inserted in the "public engagement" column of the daily papers."]

Meteorological Register, kept at the Assay Office, Calcutta, for the Month of April, 1835.

Day of the Month.	Observations at 10 A. M.							Observations at 4 P. M.						Register Thermometer Extremes.		Rain, inches.	Wind.			Weather.		
	Standard Barometer at 32°.	Wet Barometer, do.	Aqs. Ten. deduced.	Ther. in air.	Diff. or M. T. Depress.	Leslie's dif. Hygrom.	Hair Hygrometer.	Standard Bar. at 32°.	Wet Bar. at do.	Aqs. Ten. deduced.	Thermometer in air.	Different.	Leslie's dif. Hygrom.	Hair Hygrometer.	Cold on roof.	Heat in sun.		Morning.	10 A. M.	4 P. M.	Morning.	10 A. M.	Evening.
1	29,014	8,896	1,118	82,4	6,7	13,0	73	,860	,572	1,289	86,9	19,3	19,1	59	63,0	131,5		W.	NW.	sw.	haze.	fine.	clear.
2	,971	,812	1,159	83,8	5,2	11,4	80	,960	,490	1,370	88,7	20,6	20,4	60	63,7	131,5		o.	sw.	w.	fog.	clear.	do
3	,996	,880	1,116	82,3	10,0	9,0	88	,899	,498	1,401	89,4	19,8	20,2	63	66,5	132,7		S.	sw.	sw.	clear.	do	hazy.
4	,968	,788	1,180	84,4	7,6	6,7	92	,892	,498	1,394	89,7	18,7	19,7	68	70,4	115,1		S.	sw.	sw.	do	hazy.	do
5	,936	,701	1,175	84,7	7,7	6,2	92	,812	,475	1,337	86,0	12,7	13,3	82	73,0	109,2		S.	S.	S.	scud.	cum.	do
6	,920	,714	1,206	85,0	8,2	8,6	91	,738	,411	1,327	88,2	10,9	11,2	85	73,1	104,0	0.10	S.	S.	S.	cum.	cloudy.	cloudy.
7	....	....	....	....	....	....	..	,609	,557	1,252	86,1	8,0	8,5	90	68,2	92,0	0,15	S.	S.	S.	do	do	cumuli.
8	,961	,928	1,033	80,7	6,4	6,2	93	,810	,620	1,190	83,4	7,4	6,2	92	64,2	106,2		n.	n.	se.	hd. rn.	cum. cir.	fine.
9	,887	,750	1,137	83,1	4,5	4,0	96	,737	,397	1,340	87,1	9,7	5,0	87	66,0	121,2		se.	s.	sw.	fog.	cum.	cumuli.
10	,908	,737	1,171	83,9	5,4	6,0	92	,772	,430	1,342	87,8	10,8	9,8	81	73,2	129,8		s.	s.	sw.	do	fair.	do
11	,882	,632	1,250	85,8	6,8	5,5	92	,764	,400	1,364	88,7	12,0	12,5	82	73,1	123,6		S.	s.	s.	clear.	do	clear.
12	....	....	....	....	....	....	..	....	....	....	....	....	....	..	73,0	126,2		SW.	S.	s.	cirri.	do	do
13	,822	,582	1,240	85,9	8,2	8,5	93	,729	,216	1,513	89,9	16,7	16,4	74	75,0	136,8		sw.	sw.	S.	haze.	clear.	misty.
14	,879	,610	1,269	86,3	9,7	10,1	85	,799	,212	1,567	91,0	23,4	22,6	54	76,1	133,0		s.	W.	w.	clear.	fine.	fair.
15	,838	,598	1,240	86,6	8,7	8,9	89	,721	,272	1,449	90,6	21,6	21,0	58	72,2	137,2		ne.	sw.	W.	do	clear.	do
16	,768	,398	1,370	89,3	13,0	12,7	82	,654	,245	1,409	92,7	11,9	12,8	82	74,5	130,0		s.	sw.	S.	do	fine.	fine.
17	....	....	....	....	....	....	..	....	....	....	....	....	....	..	75,7	120,0		S.	S.		do	do	do
18	,770	,437	1,333	87,4	7,6	7,1	93	,643	,249	1,394	90,3	8,6	8,5	91	76,8	110,6		S.	S.	s.	cum. str.	gale.	do
19	....	....	....	....	....	....	..	....	....	....	....	....	....	..	78,5	105,2		s.			do	do	
20	,758	,430	1,328	87,3	8,1	7,7	92	,604	,226	1,378	89,3	8,3	9,0	90	77,2	91,0	1.00	S.	S.	s.	do	do	threat'ning.
21	,849	,622	1,227	84,3	6,1	5,2	94	,691	,458	1,233	85,8	5,0	5,9	96	68,0	91,5		S.	sw.	s.	do	cloudy.	fine.
22	,834	,615	1,219	85,0	5,6	4,9	96	,721	,378	1,243	88,6	10,2	10,5	83	75,2	110,8		S.	W.	nw.	overcast.	clear.	do
23	,872	,808	1,064	82,3	7,0	5,5	95	,784	,573	1,211	84,4	5,9	6,6	94	68,5	102,0	0.95	e.	E.	sw.	do	rain.	cumuli.
24	,838	,700	1,138	82,9	7,7	6,4	93	,710	,421	1,289	86,1	12,2	12,2	80	69,5	121,0		se.	w.	w.	cirri.	clear.	clear.
25	,794	,648	1,146	83,9	6,8	6,0	94	,637	,264	1,373	88,3	13,2	12,6	78	73,0	125,0		sw.	sw.	sw.	clear.	do	cloudy.
26																							
27	,890	,690	1,200	83,9	9,0	8,0	89	,754	,539	1,215	84,9	7,4	8,1	89	.....	.....	0.05	.....	nw.	se.	....	drizzle.	overcast.
28	,850	,670	1,188	83,8	7,6	7,3	91	,729	,399	1,330	88,1	9,8	9,8	86	.....	.....		.....	w.	w.	....	fair.	cumuli.
29	,826	,648	1,178	84,0	7,6	6,2	93	....	....	....	....	....	....	..	.....	.....		.....	se.	s.	....	drizzle.	do
30	,798	,554	1,254	85,4	7,7	7,0	92	,672	,190	1,482	90,4	13,1	13,0	79	.....	.....		.....	sw.	sw.	....	clear.	do
Mean,	,874	,677	1,193	84,6	7,6	7,6	90	,752	,400	1,348	88,1	12,7	12,7	79	71,4	117,7	2·25	southerly.			north-westers in the evening.		

The instruments the same and situated as usual.

A second opportunity of comparing the Assay Office Barometer with the standard instrument of the Royal Society of London has been furnished by the careful comparison of Sir Edward Ryan's Barometer with that of Sir J. Herschel at the Cape observatory. The result is that my Barometer stands ·0007 *too high*. The former comparison (see Met. Reg. Nov. 1834) made it 0·010 *too low*. The mean shews as near an accordance between the two instruments as could be desired.—J. P.

1

Seal of the present Sultan of Johore or Singapoor

2

Present Bang de per Tuan Muda of Rumbowe

3

Present Raja dhi Raja of Sungie Ooyong

4

Present Bang de per Tuan Besar of Rumbowe